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The American Antiquarian and Oriental Journal.

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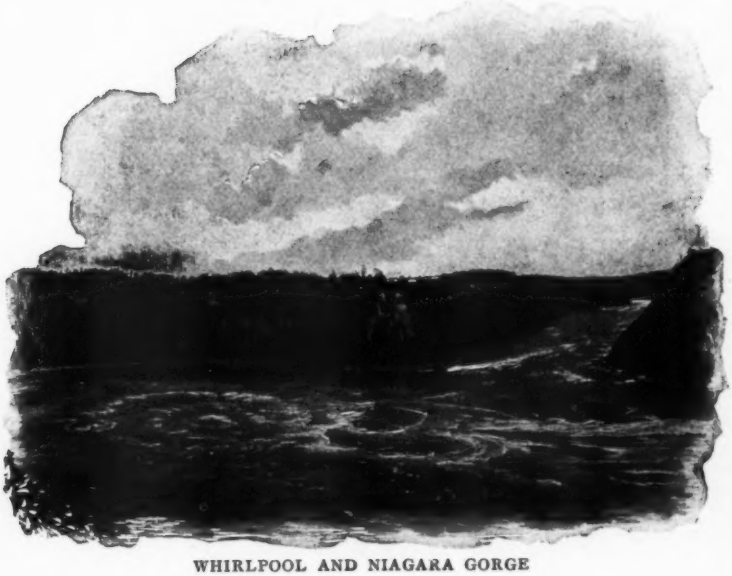
RAPIDS FROM CANADA SIDE.



WHIRLPOOL AND NIAGARA GORGE

RAPIDS ABOVE THE FALLS.

ROCKS BELOW AMERICAN FALLS.

THE

American Antiquarian

VOL. XXIII. JANUARY AND FEBRUARY, 1901. NO. 1.

THE STORY OF NIAGARA.

BY C. H. HITCHCOCK, LL. D.

There is, so far as known, no better locality than the region of the Niagara gorge to afford an insight into the length of time that has elapsed since the disappearance of the ice-sheet from the northern United States. At first it was thought to be a very simple problem. Given a gorge seven miles long, known to be lengthening annually by a definite number of feet and inches, we can ascertain the number of years required by dividing the sum total of feet by the annual recession. This result is believed to represent the period that has elapsed since the ice-age, because the Niagara River commenced its existence in consequence of the damming of the ancient Erie [Erigan] River. The original channel having been blocked, Lake Erie accumulated, and its lowest line of exit was by way of the Niagara River. Sir Charles Lyell in 1841 estimated this period to have been about 36,000 years. He supposed the annual wear to be one foot. The latest figures indicate the amount of recession to be four times as great. Hence, if there were nothing more to be said, our conclusion must be that the time needed was only one-fourth of 36,000.

But this estimate must be modified by a careful consideration of various factors. It must be conceded that the Niagara River began to flow only after the obliteration of the Erigan channel. Then the peculiar elbow at the whirlpool indicates a second blockade, and consequent divergence of the river toward

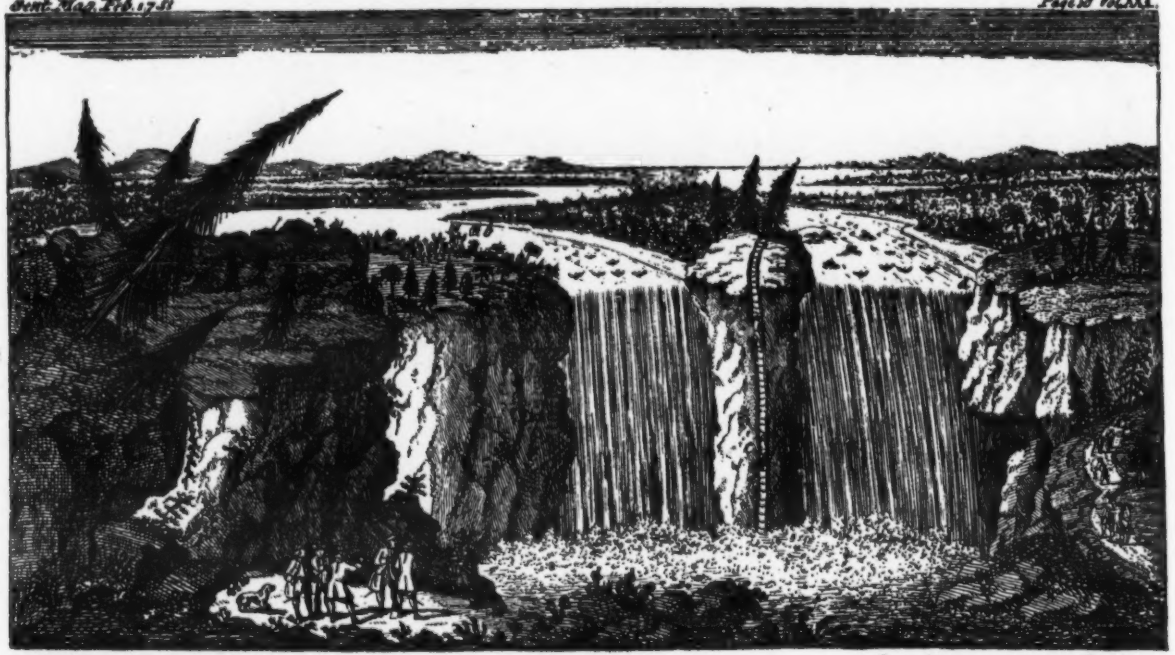
Lewiston; for in none of the numerous cañons of the West do we find any such arrangement. The gorge varies greatly in width and depth, as if the volume of the river had been diminished at times. Again, the work may have been interrupted by another glacial blockade, or modified by the presence of lakes not now existent. The story of the gorge, then, shows much complication. It will be our task to state what the principal events in the history of this region have been, so as to be able to judge of the value of computations based upon the work performed.

There is no lack of literature pertaining to this subject. The facts are of very easy apprehension; hence a multitude of authors, attracted by the sublimity of the roaring cataract, have placed their opinions upon record. Several hundred titles of these writings might be enumerated—of travellers, historians, poets, artists, statesmen, generals, divines, besides professional physicists and geologists. Among those worthy of special mention are the early pictures by Father Hennepin, as seen in 1678; by Peter Kalm in 1751; by Capt. Basil Hall in 1827 with a camera lucida; by famous artists, Church and Bierstadt, and finally by the photographer with the best of modern appliances. Bird's-eye views, with the geology, or estimates of age, came from Robert Bakewell, Jr., in 1830; Sir Charles Lyell, 1841; Prof. James Hall, 1843; Dr. Julius Pohlman, 1888, and others. The two more recent authors, who have surpassed all others by their discernment and brilliant suggestions, are Drs. J. W. Spencer and G. K. Gilbert in their writings during the past twenty years. Stations for the accurate measurement of the recession were established by James Hall in 1842; verified and observed by the United States Lake Survey in 1875, R. S. Woodward in 1886, and A. S. Kibbe in 1890. An altogether different class of papers relate to the use of the power derived from the falling water, and its transmission to great distances.

Niagara River is a part of the St. Lawrence system of drainage, commencing with the five great lakes, Superior, Michigan, Huron, Erie, and Ontario, having an area of 94,650 square miles, of which 87,410 have their outlet at Buffalo. This discharge proves to be about 275,000 cubic feet per second, or 7,000 tons, equal to the latent power every day of 200,000 tons of coal. The St. Lawrence River rises in Lake Ontario, flowing irregularly to the ocean. The entire system is a very modern river, geologically speaking, full of rapids, pools and still water. Had it existed for a long time, both the rapids and lakes would have disappeared by erosion and drainage, save as an overflow prevails because of submergence.

The Niagara River is a strait, connecting Lakes Erie and Ontario. Its depth is very constant, but varies with storms. A westerly gale may crowd water from Lake Erie; while a northerly wind may push it in a contrary direction. For this reason the falls were once almost dry for several hours.

The following statement of the various physical features is needed for the discussion of the history and age of the gorge.



a. The Place when a piece of Rock 120 ft broken from, which while standing turned the Water obliquely across the Fall as in Peyrere's Map.

A View of the Fall of Niagara.

b. Two Men passing over first Stream with Staves.
c. The Indians ascending their Ladder.

They are compiled from the maps of the United States Lake Survey and the United States Geological Survey.

	MILES OR FEET.	ALTITUDE ABOVE SEA.	DESCENT IN FEET.	WIDTH.
Lake Erie,		573		
Buffalo to head of rapids,	22 50 miles.	563	10	1 2-5 miles.
Rapids to head of falls,	.75 mile.	517	46	
American fall,		520	163	1,060 feet.
Canadian fall		517	160	3,010 feet.
Great gorge to railroad bridge,	11.750 ft. 2 25 ms.	340	17	av'g 1,300 ft.
Whirlpool Rapids,	3,900 ft. .74 m.	295	45	750 feet.
Eddy Basin,	1,500 ft. .28 m.	285	10	1,200 feet.
Whirlpool Basin,	3,400 ft. .46 m.	282	3	1,300 feet.
Whirlpool to edge of Escarpment at St. David's,	3 miles.			1,300 ft. to 1.25m.
Cove section,	7,000 feet.			1,300 feet.
Foster's Island to Catholic College,	6,187 feet.			1,300-1,700 ft.
Catholic College to mouth of gorge,	4,813 feet.			1,100-1,300 ft.
Whirlpool to Lewiston,	3.465 miles.	249	33	1,100-1,700 ft.
Lewiston to Lake Ontario,	7 miles.	247	2	2,400 feet.
Lake Erie to Ontario,	37.165 miles.		326	
Niagara Plateau,		600		

Early Geological History.

In the study of the geological history of the vicinity of Niagara, three great periods may be designated, each characterized by peculiar conditions. First, the laying down of the crystalline foundations; second, the deposition of the Silurian and later sediments upon the Archean; third, erosion and the accumulation of earth, sands, and clays. The first witnessed the action of fire; the second indicated the presence of the ocean, and the third demanded the movement of enormous glaciers with the formation of great lakes.

The nearest locality of the Archean crystallines outcropping at the surface, is in Canada, more than a hundred miles to the north. The rocks are of the granite order—derived from the primeval crust. The southern border of this Archean coincided with a shore line from the Thousand Islands to Georgian Bay on Lake Huron, against which the sands, limestones and clays of the Lower Silurian terranes were slowly deposited in definite

order. A boring 1,600 feet deep at the edge of Lake Ontario, through these lower deposits, might reach the crystalline schists, which must also extend below Niagara. A restoration of the conditions prevailing here all through Silurian time would show bands of sediment added one by one to the crystalline tract—each age indicating a growing area of land, while the shore line moved southerly. At Lewiston the red clays and sands of the Medina terrane prevail, and they constitute the visible foundation of the plateau. The sands represent an ancient sea beach which supported worms, mollusca and trilobites, besides marine plants. The waves pushed shells upwards, and as the water receded there would be left the lines made by the upper limit of the surf, and rill marks produced by the rush of the current over the valves of the brachiopods. Every vestige of wave-action is perfectly preserved in the solid rock. In another period limestone was produced. Evidently this was a coral growth, for their remains are abundant. Stated definitely, the following is the order of the terranes: first, the Medina group, consisting of soft red shales and sandstones below, a gray sandstone, and another series of red sandstone and shales; in all a thousand feet in thickness. Above the Medina is the Clinton group of shales and limestone, followed by the Niagara shale and limestone. At Lewiston above the water-level the Medina is 210 feet thick; the Clinton, 29; the Niagara shale, 82, and the limestone, 20. The last becomes thicker in passing southerly, reaching 65 feet, of which 55 are exposed at the falls. This variation is due to a greater erosion at the north. The shale was a calcareous mud containing organic matter, which still emits an oily smell when freshly broken.

After the deposition of the layers named, there ensued the Salina period, when large bodies of salt accumulated from the evaporation of ocean water. This rock lies to the south of the gorge, and before reaching Buffalo the Lower Helderburg limestone succeeds; so that the whole of the Upper Silurian is displayed along the Niagara River, with a thickness of about 900 feet. These rocks constitute a plateau, extending as far east as Rochester, and north to Georgian Bay; the northern edge has a steep slope, which runs parallel to Lake Ontario and then turns northwesterly and reaches the promontory between the two sections of Lake Huron.* The strata underlying this plateau slope southerly about twelve feet to the mile. The altitude of the plain is about six hundred feet above the sea. The Genessee and the Niagara are the most important streams that have sawed through it. The smaller streams, like the Tonawanda, Chippewa, and the Grand of Ontario, flow along depressions in this plateau, and its general mass may be compared to a dam, causing the water from the south to accumulate as Lake Erie.

After the deposition of the Upper Silurian terranes the work of continent-building shifted to the south: thick flags,

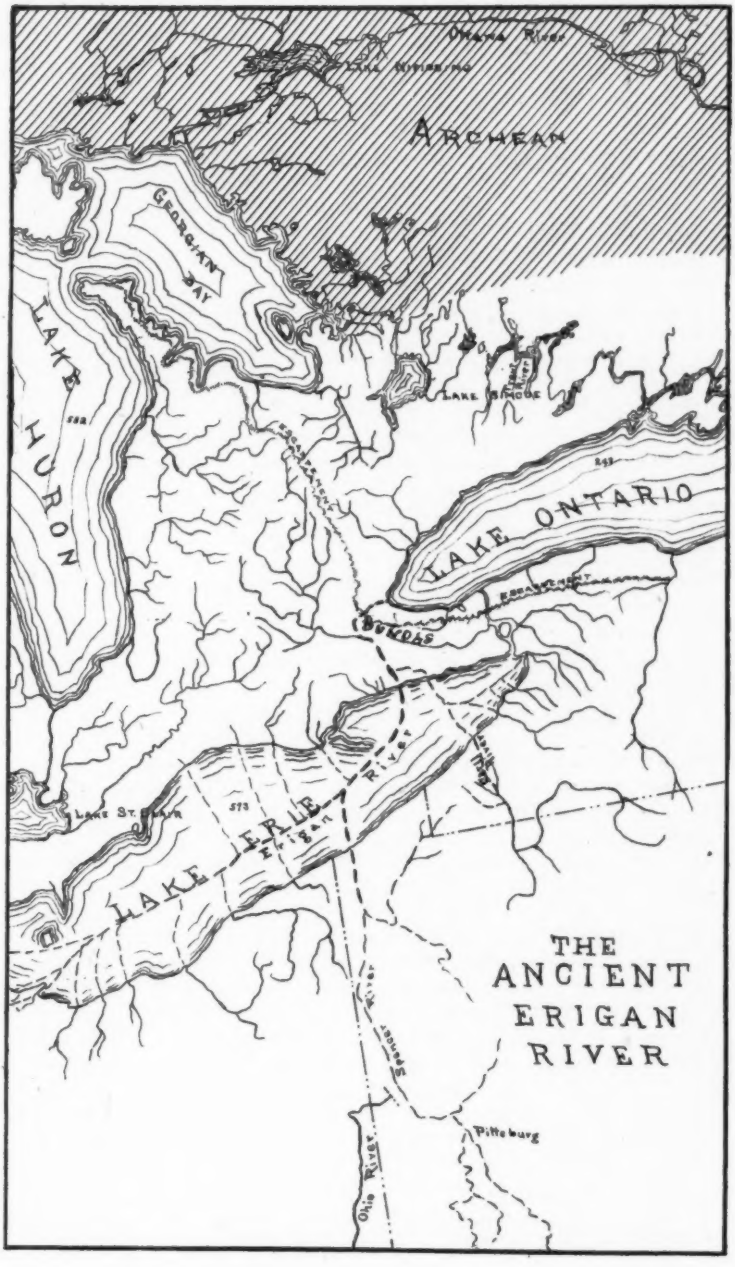
* See Plate I

grits and shale mainly constituting the Devonian system, followed by carboniferous sediments supporting an immense vegetation over the region of the Appalachian coal fields, and eventually rising into mountains at the close of the Paleozoic. Thus originated a grand system of drainage, arising in West Virginia, southwestern Pennsylvania, eastern Ohio, and western New York, tributary to the St. Lawrence. The Monongahela and Yonghiogheney, rising in West Virginia, flowed northerly down the Ohio to the great bend in Beaver County, and then continued in the same direction in the valley of the Big Beaver River, the Conoquenessing, the Shenango, and over the present divide by Conneaut Lake into Lake Erie. The rocky floor slopes from Pittsburg northerly. The drainage of the upper Allegheny River was also to the north, the reverse of that now prevailing. A part of it joined the stream just described, flowing from Oil City up French Creek, thence into the Conneaut. Another river began to the southeast of Warren, Pa., ascended the present Conewango Creek, and at Falconer, N. Y., received the drainage of the upper Allegheny from Potter County, Pa., receiving also the outlet from Chatauqua Lake, and reached Lake Erie at Dunkirk. Of course the present streams discharging into Lake Erie from Buffalo around to Lake St. Clair flowed as at present. As the result, there was a very large river made up from these tributaries, which followed the main channel of Lake Erie, leaving it at the mouth of the Grand River of Ontario, pursuing a northerly and northeasterly course till it reached Lake Ontario at Hamilton. Plate I. is drawn to represent the drainage system of this ancient Erigan River. Like the modern Niagara, it was compelled to cut its way through the plateau. Prof. J W. Spencer was the first to point out the existence of this great river across the Ontario peninsula, and he clearly proved its course through the Dundas Valley in a cañon much exceeding the dimensions of the modern Niagara, now covered by drift.* This system of drainage doubtless existed through all Mesozoic and Tertiary time. Coeval with the flowage of the Erigan River, was the excavation of the basin of Lake Ontario.

It was stated above that the Lower Silurian rocks, which are calcareous, occupy the region between the escarpment and the crystallines of Ontario. The ordinary subaerial agents of erosion must have been occupied with the removal of these limestones during the whole time from their deposition to the present. Because these rocks were more easily removed than the overlying sandstone, the drainage was made to move easterly from the very first. In a similar manner the whole of the Appalachian Valley from the St. Lawrence to Alabama has been excavated; eight and ten thousand feet of strata having disappeared. Perhaps it may be possible to explain the excavation of Lake Ontario below the sea level by the constant

*American Philosophical Society Proceedings, Vol XIX., 1881.

PLATE I


Ottawa River
Lake Nipissing
ARCHEAN
GEORGIAN BAY
LAKE HURON
LAKE SIMCOE
LAKE ONTARIO
BUFFALO
Lake St. Clair
LAKE ERIE
Erian
Erian River
THE ANCIENT ERIGAN RIVER
Pittsburg
Ohio River

flowage of water containing the limestone in solution. In this way rock can be excavated below the natural fall from a higher to a lower level, and thus save the necessity of a belief in a change of altitude to explain deep seated excavations in soluble materials.

Advent of the Ice Age.

Near the close of the Tertiary Age the continent rose thousands of feet, judging from the submerged fiords upon both coasts. It may have been that this elevation was great enough to allow Lake Ontario to flow to the Atlantic. The amount was sufficient to bring on intense cold, so as to cover the land with glaciers. The latest view, hardly as yet elaborated, represents the succession of three or more glacial epochs, the first culminating in a Cordilleran ice cap, with its maximum in British Columbia. Glaciers moved across the Saskatchewan plains and down the upper Missouri Valley. It is not proved that it extended as far as to the great lakes. With a change in the climate, the Cordilleran cap disappeared, followed by a temperate epoch; and then a second ice cap accumulated on the northwest shores of Hudson's Bay. Though upon a low foundation this ice grew to mountainous altitudes, known as the Kewatin mass, which moved southerly into the Mississippi Valley and southeasterly over the great lakes. As southeast courses of striæ are common in the Ontario peninsula, it is probable that this incursion brought material to fill up the Erigan Valley; and thus in the temperate period following, the drainage of that water-course accumulated to give us Lake Erie. As the discharge by the way of Grand River and the Dundas Valley had been impeded by the glacial débris, the water was compelled to seek an outlet through the Niagara depression, and hence the birth of the Niagara River. No one can tell how extensive were the previously existing excavations made by the pre-glacial Tonawanda and Chippewa Rivers. Whatever they were, the new river took possession of the valley and pushed northerly past the whirlpool and the St. David's channel to a confluence with Lake Ontario at its extreme northerly end. This early Niagara carried no less water than it does now—perhaps more—and its sources may have been confined to the Erigan Basin. These were capable of eroding the greater Dundas Valley; and why not the earlier Niagara as well? The gorge, as we lose sight of it at the whirlpool, equals in its dimensions those of any part of the chasm: while the St. David's terminus much exceeds in size the outlet at Lewiston. If the entire Erigan drainage were not available, the upper great lakes must have been in existence and flowed through Lake St. Clair, as at present. The third glacial epoch will be mentioned later.

Reality of the St. David's Channel.

The following considerations may aid us in the belief in the reality of the St. David's Channel: (1) The direct route is the

natural course of the river, and for one thousand feet the water still flows as in the former time. (2) The bend of the river at the whirlpool is phenomenal, nothing like it has yet been described among the numerous cañons of the Cordilleras. (3) The character of the material in the gorge is such as implies glacial transportation. At the end of the whirlpool about a hundred feet thickness of sand and clay are well exposed to view, underlying red till filling the whole gorge nearly forty feet higher than the flat surface of the limestone just at the outlet. This, till at the trestle over Bowman's Creek, holds considerable clay over a very stony mass. The creek clings to the west wall, not following the middle of the gorge, as commonly represented upon the Lake Survey maps. About one and a half miles northwesterly wells have been sunk a hundred feet in earth without reaching rock. Half a mile farther, two railroads have cut deeply through sand; and at the edge of the plateau are several cuttings and pits of gravel, certainly fifty feet deep. This modified drift may be a mile wide. It resembles an esker; and must represent the melting of a glacial tongue pushing from the main sheet up a notch in the edge of the plateau. The width of the gap in the rocky escarpment is about one and one-third miles. (4) The west wall of the cañon has been glaciated, for fully a half mile northerly from a point opposite the outlet. The smoothing and striation is upon both the Niagara and Clinton limestones, with a southeast direction, corresponding to the course of the gorge itself, but differing fully seventy degrees from that observed upon the surface of the plateau. The same course has been noted at Thorold, and is quite common near the Dundas Valley: so that it is not necessarily a local deflection produced by the crowding of the ice through the St. David's Channel; it may result from the movement that blocked the Erigan gorge, though it seems better to refer it to the later epoch. (5) The depth of the Niagara River in the whirlpool and just below, in the lower gorge, are best explained by supposing the existence of an earlier St. David's Channel. The water is 150 feet deep in the whirlpool, is very shallow at the outlet, making a shelf there, while the normal great depth is renewed below. Deep excavations are made by a cataract; shallow ones, by rapids. When the river had worn back nearly to the whirlpool, there would be only a narrow rim separating the cataract from the ponded water above. The pressure of the water above would knock the wall down laterally, and thus there would have been no pounding of the lower layers by the cataract. If the wearing action had been effected by falling water continuously around the great bend, the depth would have been uniform, whereas now there is a shallow river. Hence, it is evident that the whirlpool pit existed before the origination of the lower gorge.

Granting the existence of St. David's Channel the following events seem to have been necessitated: (1) A Niagara River,

fully equal in dimensions to the present stream, flowed from the whirlpool to the edge of the escarpment, near St. David's, and thence to Lake Ontario. A cataract commenced at the cliff and cut its way back the entire distance of three miles. As intimated above, we can understand that sufficient water came down the Erigan River to accomplish this result; and, therefore, it is not *necessary* to say that the upper great lakes contributed their share, as now, to swell the stream; yet they may have done so. (2) Frigid conditions brought on a third ice sheet [Labrador] which pressed against the edge of the bluff, broadened the mouth of the gorge, especially eroding the western wall because of the movement in a southwesterly direction, and filled the channel with till and modified drift, to the height of 300 feet. (3) The return of temperate conditions melted the ice and restored Niagara River, but it had not sufficient volume to overflow the barrier of till. Hence, it turned its direction to the northeast, following a slight depression in the plateau to the edge of the escarpment at Lewiston. After the stream had cut its way back to what remained of the original channel, the whirlpool was set in motion.

Erosion of the Lower Gorge.

There must have been some erosion in pre-glacial times along the lower part of this section, as is evidenced by the tributary cañons at the Devil's Hole and Smeaton Creek. What it amounted to in the main stream, no one can tell. The top of the cliff at Lewiston is about 575 feet, and the fall 325 feet. It would not have been well defined at first, because of the greater altitude of Lake Ontario and the character of the rock. The fall being over the Niagara limestone and shale directly into the level of the lake, would present a cataract 100 feet high, and could not act energetically upon the Clinton limestone beneath. Hence this becomes an upper fall, receding more rapidly than a second one, which would make its appearance as soon as the lake disappeared. For similar reasons this would wear away only the Clinton limestone and shale of thirty feet thickness. Thus there would be two cataracts, separated by a considerable interval. There remains the Medina sandstones and shales, which would have their own cataract, and so Niagara commenced the excavation of the lower gorge by a triple division of its energy.

This view is confirmed by a study of the Falls of the Genessee, seventy miles further east, at Rochester. The lower fall there, is over the Medina terrane. One-fourth of a mile higher, is the second fall of twenty-five feet over the Clinton limestone. A mile and a half above is the greater fall of 110 feet over the Niagara limestone and shale, precisely as at Niagara. The strata dip to the south in a similar way, but the limestone is only 70 feet thick, as opposed to 140 feet farther west. The escarpment is less pronounced at Rochester.

Two very important conclusions follow: First, the upper falls, receding more rapidly at first and more slowly afterwards, must have reached the island at Wintergreen flat before the lower cataracts caught up with it. Second, the falls being worn out individually, the depth of the excavations must have been small. The profound depths of the upper great gorge are wholly wanting below the island. The width of the lower gorge is nearly as great as that above the railroad bridges, but the water is not very deep. Even if the whole volume of the present river was concerned in the erosion, the depth would be small.

Of the 330 feet exposed in the cliff at the mouth of the gorge, about 200 belong to the Medina terrane, and must have been the material over which the lower fall poured. This dips southerly, so that only forty feet of it rise above the river at the whirlpool. While this fall receded slowly at first, its pace would be greatly quickened in passing southerly. The second fall must have receded uniformly, because the thickness of the Clinton is the same throughout. The upper limestone is twice as thick at the whirlpool as at Lewiston. So the upper fall could not recede so fast as at first, and the lower cataract gained constantly upon it.

Looking at the amount of water in the early Ontario, the Niagara must have fallen into it at a level 135 higher than it is now. This would have brought the level of the water to the top of the lower grey sandstone, or that just at the river's surface at the whirlpool. The lower fall, then, did not start so early as the others. But in a later epoch the lake receded so that its surface was over eighty feet lower than now. With the greater depth of fall the erosion of the lower rock would have proceeded more energetically. Perhaps the average recession has been the same as if there had been no variation in its rate. We do not consider in this sketch the excavation of the softer parts of the Medina terrane below Lewiston. Its presence neither accelerated nor retarded the excavation of the greater gorge.

A mile below the whirlpool there seems to have been an island in the midst of the channel analogous to Goat Island, between the American and Canadian falls. Foster's flat shows a surface that was swept by the river before the excavation of the gorge. About fifteen feet below the level of the electric road at Wintergreen flat, is a rock terrace, 750 feet long, and 600 feet broad, which is believed to have been fashioned by the western part of the early Niagara; and at its northern end is a precipice over which the water fell into Foster's glen. The sloping area between the flat and the river, 2,500 feet long, and 750 feet wide, is covered by immense blocks of Niagara limestone. The explanation given by Dr. Gilbert* is essentially as follows: The river wore its way back to the lower limit of

* "Niagara Falls and Their History," Monographs of National Geographic Society, 1895.

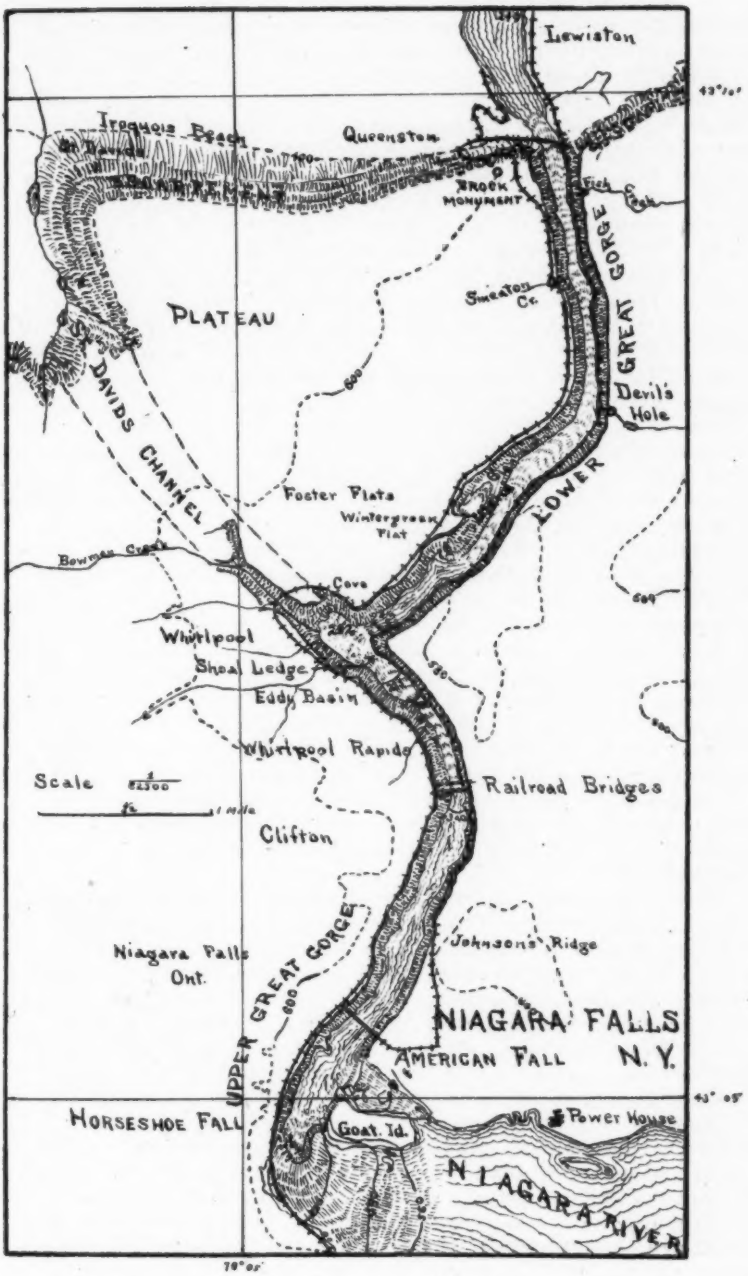
Foster's glen in a single broad cataract. Here, it was divided by a narrow strip analogous to Goat Island at the existing falls; the main channel being upon the American, instead of the Canadian side. The falls receded faster upon the eastern side; so that when the island had been passed, all the stream was captured by the American branch, and the Canadian fall ceased to exist. In this erosion the river wore out a peculiar notch pointing northeasterly to the Wintergreen platform. The island disappeared later because of the undermining of the shale and the consequent fall of the limestone. The published contours show the northeast extension of the rock below Wintergreen flat. The cataract did not excavate anything below the Clinton limestone upon this island. These and other details in the gorge are exhibited in Plate II.

History of the Great Lakes.

In continuing our study of the cañon, the next section to be described is that of the whirlpool rapids, where the gorge is very narrow. To appreciate the views entertained respecting the condition of Niagara River when this section was excavated, it will be necessary to take into account the variations in the size and drainage of the upper great lakes developed during the melting of the Labador ice-sheet. At present these bodies of water discharge through Niagara. In the past, this has not always been the case; and whenever the drainage of any of these lakes has been diverted elsewhere, the volume of the Niagara has been just so much diminished. First, we endeavor to determine the position and succession of these lakes; secondly, to correlate these bodies of water with the making of the different sections of the gorge. Necessarily these conclusions at present must be regarded as only tentative.

It is premised that the whole of the region of the great lakes, from Ontario to Superior, was covered by the Labrador ice-sheet, moving southwesterly and receding northeasterly. The greatest movement would have been in the valleys, as that was in the region of least resistance. The valleys thus occupied were those of Lake Superior at Duluth and south of Keweenaw point; Lake Michigan at Green Bay and Chicago; Lake Huron near Saginaw, Lake St. Clair and Georgian Bay. The ice thawed at the ends of these glacial lobes; and as they receded considerable water accumulated above the level of the several outlets, or what are now watersheds. Hence, quite early in the recession there were simultaneous lakes at Duluth, the water draining into the St. Croix River 468 feet above Lake Superior; at Chicago, only 58 feet higher than Lake Michigan, flowing into the Des Plaines River, and at Fort Wayne, Indiana, 225 feet higher than Lake Erie, emptying into the Wabash River. Each of these small lakes increased in size as fast as the ice to the northeast melted; until finally, without mentioning details, the waters of Lakes Superior, Michigan, Huron, and Erie were combined into one body, dis-

PLATE II


Lewiston
Queenston
Brock Monument
Fish Creek
Great Gorge
Devil's Hole
Smeaton Cr.
Plateau
St. Davids Channel
Foster Flats
Wintergreen Flat
Lower
Bowman Creek
Cove
Whirlpool
Shoal Ledge
Eddy Basin
Whirlpool Rapids
Scale
1 mile
Railroad Bridges
Clifton
Niagara Falls Ont.
Upper Great Gorge
Johnsons Ridge
NIAGARA FALLS
AMERICAN FALL
N. Y.
HORSESHOE FALL
Goat Id.
Power House
NIAGARA RIVER

charging at Chicago, because this was the lowest point in the whole shore line, the altitude being about 600 feet. This has received the name of Warren Lake.

Later in the history the outlet shifted to the east, and while the St. Lawrence was still blockaded the discharge was through the Mohawk River into the Hudson and thence to the sea. This has been called Algonquin Lake, continuous from Superior, across Huron and Erie to Ontario. When the water had fallen to 144 feet above Erie, a strait connected the two lower lakes. A beach and spit, formed at this time at Lundy's Lane, near Niagara, has been described by Spencer, who notes it also at Font Hill, Ontario, and Ebenezer, New York. No epoch of prolonged rest seems to have been reached in the further process of shallowing, till Erie was ponded separately from Ontario by the Johnson Ridge, (so named by Spencer), the highest divide crossing the Niagara gorge near Inspiration Point. This would represent the beginning of the present Niagara, discharging the waters of Erie into the Ontario basin, with an outlet still through the Mohawk. For a time the water rested at a level 300 feet below the Lundy beach, and 220 feet above the present Ontario, and has been named Lake Iroquois. It received the outflow from Lake Algonquin through the Georgian Bay of Huron, into Lake Simcoe and Trent River. The St. Clair outlet was probably closed while the Trent River connected Huron with Iroquois.

The ice front receded next so as to change the outlet of the upper lakes from the Trent to the Ottawa River, *via* Lake Nipissing, originating the sprawling Nipissing great lake, entirely disconnected with Lake Erie, which now had an independent existence with a Niagara much reduced in size. This epoch is regarded by F. B. Taylor as coeval with the highest extension of the sea to Lake Ontario in the Champlain time. Before this, the ice barrier to the east had disappeared and the St. Lawrence begun its independent existence, relieving the Mohawk.

The study of the deserted strands of these several lakes has led to a belief in their deformation. A beach encircling a lake, should certainly be formed at the same level; when carefully followed from point to point, it has been discovered to be unequally elevated above the water. The rise of the land has been invariably to the northeast; and the decline to the southwest. When the land to the northeast rises, the water will move to the southwest, and the old beach be elevated at one end and depressed at the other. This result may be illustrated by tipping a bowl containing water. The liquid will rise towards the edge that has been depressed and fall away from the raised part. If a lake had its outlet on the southwest side, the canting opposite may have been great enough to cause it to discharge in the opposite direction. Such a deformation may have been the cause of the shifting of the outlet of Lake Warren from Chicago to the Mohawk: if the canting should

be in the opposite direction, the place of discharge might also be changed. Dr. Gilbert presents considerations to show that the northeast uplifting of the rims of the lake barriers is still in progress. Should this continue a few thousand years from now henceforth, Niagara would cease to run, the wharves of Buffalo would need extension, and the outlet for all the great lakes, except Ontario, would be at Chicago. Lake Erie is now only nine feet lower than Lake Michigan; so that but little change of level would be required to effect this change.

A brief statement of the altitudes of the Iroquois beach around Lake Ontario may render the preceding paragraph better understood. This beach is now much lower at the west end. Prof. Spencer finds it to stand at 362 feet above the sea at Hamilton, Ontario, and to rise to 632 feet at Trenton, Ontario, at the east end of Ontario. Dr. Gilbert finds this beach to be 370 feet at St. Davids, Ontario, and traces it to 657 feet at Adams, New York. The rise of this beach near the west end of Ontario is 1.60 foot per mile. Near Oneida Lake the uplift is 3.5 feet per mile, and near Watertown, New York, it is 5 feet per mile. The total rise from Hamilton to Trenton is 270 feet; from Hamilton to Adams, 295 feet. Other beaches have been found beneath the Iroquois, which pass under the lake in going west. Thus near Watertown, there is one 200 feet lower; at Oswego, one 185 feet lower than the Iroquois beach. Continuing this lower beach westward, it should be found 78 feet below the surface of Ontario, off the mouth of the Niagara River, which stream would have extended four miles further north, cutting a channel through shales. The existence of the conditions requisite for the formation of this beach affords us the evidence of the former greater fall of Niagara over the Lewiston escarpment, mentioned above.

It is interesting to note the most western limit of the sea in the Ontario basin. Ramsay mentions the occurrence of marine shells at Kingston, Ontario; and the cetacean cited by J. W. Dawson at Smith's Falls came from an altitude of 440 feet. Taylor states that the top of this deposit is about thirty feet higher, which would be 223 feet above Ontario. The beach, 200 feet below the Iroquois level at Watertown, must be 210 feet above Ontario. Is it possible that this is of marine origin? The near approach of the levels to each other proves the former connection of the ocean with Lake Ontario in the Champlain period. It extended likewise above Pembroke, in the valley of the Ottawa. This marine shoreline is traced down the St. Lawrence to the gulf, culminating near the Saguenay, at about 800 feet above the sea; so that the differential elevation indicated by the Lake Iroquois beds was continued through most of Lower Canada.

From the statements now made of the history of the great lakes, there seems to have been two former possible outlets for the waters above St. Clair—by the Trent River and Lake Nipissing; and it has been suggested by Dr.

Gilbert that; when the discharge was by the former route, the Niagara River cut its way through the shoals at Wintergreen flat; and that when the water flowed through the Nipissing channel, the gorge of the whirlpool rapids was excavated. Both those routes are shown distinctly upon the map, Plate I, It is not easy to show just what part of the lower gorge was excavated, when the upper lakes discharged through the Trent outlet. At the present writing, it may be best to say that, because of the limited time during which this discharge was effective, no marked effect was produced.

It is different with the Nipissing outlet. Mr. Taylor has shown that this discharge must have operated for a very long period. The Nipissing beach is recognized upon all the upper lakes, being the best defined of any of the ancient strands. At the outlet at North Bay it is 120 feet above Lake Huron; 45 feet in Mackinaw Straits; 50 feet above Lake Superior at Sault Ste Marie; and passes beneath the lake level 40 feet at Port Huron 100 at Chigago, and 25 at Duluth. Fully eight-ninths of the water passed to the Ottawa River, leaving only one-ninth of the present volume for the Niagara. Consequently the gorge made by the Erie-Niagara must have been comparatively small. Its width at the top is 750 feet, and the depth of the river estimated at 35 feet. The descent is 45 feet, and the length three-fourths of a mile.

There is quite a contrast between these and the rapids above the cataract, which descend the same amount and have a similar length. The action is deliberate in the one, and impetuous in the other. The shallowness may result because of the want of erosive power in the smaller volume of water falling over the cliff, or may be due in part to the superior hardness of the rock at the base of the falls, as suggested by Professor James Hall.

Some authors, following Pohlman, believe this part of the gorge was made by a smaller stream in pre-glacial times, perhaps in connection with the St. David's Channel, and before the modern Niagara came into being. This seems inadmissible, because the St. David's Channel evidently required a river of large volume for its excavation, greater than the Erie-Niagara, and the whirlpool rapids' gorge had a later origin. These facts also enforce the conclusion that it is not likely that in any case a small gorge would have been enlarged to the full width by the later greater volume of water. Were this true, this narrow section should show evidences of increasing enlargement during the latest episode of excavation. All agree that the river which excavated this section was of comparatively small size, and, consequently, that the duration of this episode must have been correspondingly great.

There is a shoal ledge between the whirlpool and Eddy

THE FALLS FROM CANADA SIDE.

FALLS AND GOAT ISLAND.

BIRD'S-EYE VIEW OF NIAGARA RIVER.

basin, not unlike the one between the whirlpool and cove, which was accounted for by supposing the presence of the water removed a rim of rock rapidly, without the aid of the cataract. Mr. Taylor suggests a species of weathering for its presence here. It is presumed that the St. David's Niagara eroded the gorge back to this ledge, when the work suddenly stopped. If the cliff were exposed to the elements for a time, the falling of talus blocks would ensue, with some weathering. Or the ice known to have moved through the buried gorge may have impinged against this ledge, and fractured it. It must be remembered that, according to our views, this ledge was exposed for a very long time—while the whole of the gorge between the whirlpool and Lewiston was being excavated: so that the cliff could hardly fail to have been operated upon in some way. When the cataract commenced above the whirlpool, it would be occupied first with removing débris, and not in channeling out the bottom. These suggestions may show why that ledge remained shoal.

The Upper Section.

Between the falls and the railroad bridges, a distance of two and one-fourth miles, the interpretation of the history is easy. The gorge is uniformly of great width and depth, 1,300 feet in width and with the ordinary depth of 160 feet for the river. At the very cataract the bottom of the river is 100 feet lower than the level of Lake Ontario. The water moves slowly, falling about seven feet to the mile. The rocks vary but little in this section. All agree that the conditions determining the formation of this gorge are practically the same with those now prevailing; and, consequently, the only change in the scenery has been the position of the cataract. Having the same volume as now, the levels of all the upper lakes have not varied appreciably. Without doubt, during this episode, the falls have been viewed by the aborigines of our continent as they carried their canoes and cargoes from lake to lake.

The increase in the volume of water is supposed to have been occasioned by the rising of the land at North Bay; damming the water and compelling it to wear its channel through Lake St. Clair to Lake Erie. When the rush began, it bared many acres of rock on both sides of the river, leaving various denuded tracts, as the flat two miles in length, south of the steel arch bridge, on the Canadian side, and a very narrow strip on the American side, reaching as low as to the whirlpool, give evidence. These flats are like the bed of Niagara above the rapids, if the water were removed and vegetation had gained a footing. Because of the presence of these old river beds where the Johnson ridge crosses the gorge, it seems to us that it furnished no obstacle to the free passage of the water. This ridge is an

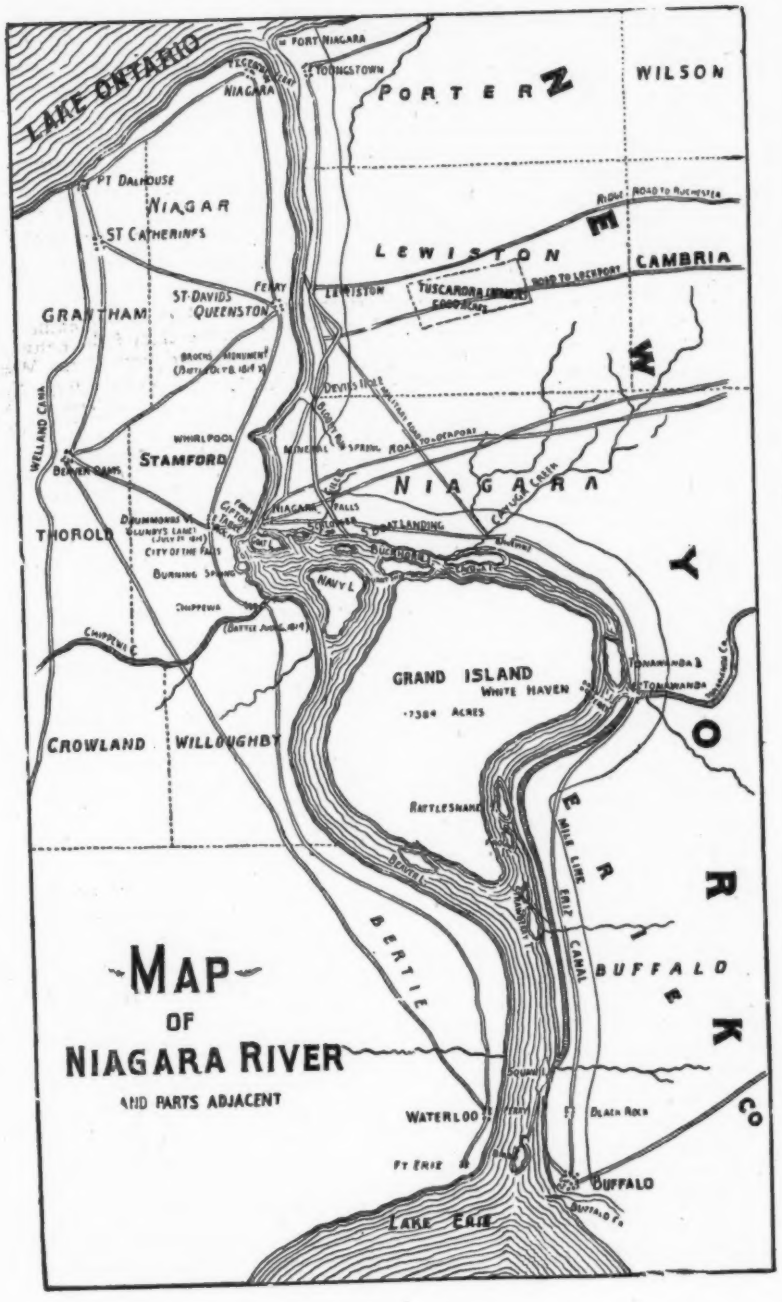
anticlinal swelling in the strata, but had been broken down by early erosion, so that really no greater mass of limestone has been excavated here than elsewhere in this section.

Goat Island rose higher than the water on either side, and, therefore, divided the stream into unequal portions. Its former extension northerly, may be indicated by the promontory directly opposite the north end of the American fall, utilized as a pier for the landing of the Maid of the Mist, for there is a recession in the cliff just behind. It would seem that the former northern extent of the island crowded the Canadian fall so that it was compelled to excavate a place for itself, and cut into the wall back of the promontory.

The occurrence of fluviatile shells in various places along the banks illustrates another phase in this history: the presence of water, sometimes thirty feet above the present level. The highest locality observed, is at the Bowen place, three miles above the falls. Next, they are well shown in the recent excavations for the new wheel-pit of the Cataract Construction Company. The opening shows two feet of clay and sand at the surface, overlying a thicker sandy mass containing *Cyclas, Goniobasis, Unio* and *Planorbis* in considerable abundance. At the base of the earthy material is a mass of till ten feet thick, resting upon the glaciated surface of the Niagara limestone. The locality upon Goat Island has been studied by Lyell and Hall. In a gravel pit now being excavated these same shells occur plentifully; some of the *Unios* and *Cyclas* still having their valves closed. This deposit is fully twenty-five feet thick, mostly of coarse gravel, readily correlated with corresponding beds in the villages upon both sides of the river. At Clifton sixteen species have been found, adding to the above the genera *Physa, Limnæa, Paludina, Amnicola, Margaritana* and *Pisidium.* Other localities are just below the railroad bridges on the west side, and on both sides of the whirlpool. Their surface altitudes vary from 566 to 575 feet above the sea. Professor Hall says that the pebbles upon Goat Island have been transported northerly, as they contain fragments of the Black rock limestone at Buffalo. He thinks the action was fluviatile, the first condition having been that of a quiet lake, followed by quite a strong current. Hence, the correlation is with the lake covering this region after the deposition of the Lundy beach.

Recession of the Cataract.

Everyone has heard how the cataract recedes and the gorge elongates. The water pours over a cliff of hard limestone, from 140 to 170 feet deep, and pounds upon the soft rocks beneath. As these give way, the higher, harder strata project like cornices, and when they have assumed considerable prominence, being unsupported, they fall down. As


LAKE ONTARIO
FORT NIAGARA
YOUNGSTOWN
PORTER
WILSON
PT DALHOUSE
NIAGAR
ST CATHERINES
ROAD TO ROCHESTER
LEWISTON
CAMBRIA
ROAD TO LOCKPORT
GRANTHAM
ST DAVIDS
QUEENSTON
FERRY
TUSCARORA
WHIRLPOOL
STAMFORD
NIAGARA
THOROLD
NIAGARA FALLS
BOAT LANDING
CITY OF THE FALLS
BURNING SPRING
NAVY I
GRAND ISLAND
WHITE HAVEN
1384 ACRES
TONAWANDA
CROWLAND
WILLOUGHBY
RATTLESNAKE
ERIE CANAL
BUFFALO
BERTIE
MAP
OF
NIAGARA RIVER
AND PARTS ADJACENT
WATERLOO
BLACK ROCK
PT ERIE
BUFFALO
LAKE ERIE

seen at the Horseshoe Falls, erosion is more effective in the center of the current. The stream rushes more and more furiously into the middle, and tends to abstract some water from the sides—perhaps leaving large surfaces of rock bare. The undermining of the cliffs causes these "table-rocks" to fall, eventually, and thus the width of the gorge is kept essentially uniform; and in the long run, the breadth keeps pace with the extremest point of erosion.

Only a few years' interval is required for noting these changes. Within the thirty years of my own observation, the middle of the Horseshoe Fall has become more pointed, and the amount of water at the margins runs more feebly, or else has developed bare surfaces. In illustration of the increase of the width of the gorge, I may quote from a telegram sent to the Press twenty-five years since, which may be duplicated every twenty-five years:

GREAT FALL OF ROCK AT NIAGARA FALLS.—Buffalo, September 5. Several hundred tons of rock, which projected from the side of the bank in Prospect Park, beneath the platform which overlooks the Maid of the Mist landing, and about midway from the top of the bank, fell this morning. No damage was done. The immense mass of débris fell with a crash which was heard in the village. It does not in any way affect the top of the bank in this vicinity

The piles of talus upon both flanks of the gorge throughout its seven miles of extent, testify to the wide extent and constancy of this movement. The fragments at the base of the cataract will be broken quite rapidly, as nothing can resist the force of the fall. The depth of the water here is greater below the level of the stream than the height of the rock above. The limestone is from 60 to 80 feet thick; the shale, 82; the Clinton limestone, 30 feet. Beneath the water level there may be 200 feet of the Medina terrane.

By comparing the best views of the falls taken at different dates, it is very easy to note the fact of recession. Precision has been given to the rate by careful measurements, with the most delicate instruments, of the positions of every part of the cataracts at stated intervals. It is usual to compare the positions determined trigonometrically by Prof. Hall in 1842, and in 1890 by Engineer A. S. Kibbe. During this period of 48 years, about 220 feet in length of the limestone has been removed, or about 4½ feet each year. This means that the gorge is lengthened by this amount each year. Although the uppermost part of the fall is narrow, the gorge will broaden as fast as the apex recedes, as explained above; and therefore it is reasonable to use the rate of recession of the fall as equivalent to the average of elongation of the gorge. Here and there the gorge may widen or contract, according to variations in the volume of the water, its velocity, the width of the channels, the thickness of the limestones and other rocks, their comparative hardness, etc. It is not our purpose to present allowances for these varied conditions, as the approximate estimate de-

rived from the rate of recession will indicate how the calculations should be made.

Estimates of Age in Years.

Let us assume the present rate of recession to be four feet annually. This is less than what has been observed, but some think that the time for the wearing action must have been greater, and the omission of the half foot may be nearer the true figure. There is a greater thickness of limestone at the Johnson ridge than elsewhere, in the first section of the gorge, from the falls to near the railroad bridges, and possibly more time would be required for its erosion. But it seems as if this excess of thickness was removed in pre-glacial times, because the flat produced by the ancient bed of the river, before the erosion of the rock had been effected, slopes uniformly, without regard to the presence of the ridge. Hence this excess of rock has not materially affected the rate of erosion here. The total length of this first section of the gorge is 11,750 feet. This measurement was made in 1875, and the gorge must now be over one hundred feet longer, making the entire length 11,850 feet. Divide this by four, the number of feet the cataract recedes annually and the quotient is 2,962; *i. e.* the beginning of the great cataract dates back to 1062 B. C., three hundred years before the time of Romulus, or to the reign of King David at Jerusalem.

The next section is that of the whirlpool rapids, 3,900 feet. If the water of Niagara came from Lake Erie alone, under existing conditions, its volume would have been three-fourteenths of the present flow. This is less than the volume of the water pouring over the American fall, which recedes 0.64 of a foot annually. This stream may be conceived to wear away the rock at the rate of six inches annually. If so, it would have required 7,800 years for the formation of the gorge of the whirlpool rapids.

The Eddy basin seems to have been worn by the normal Niagara. With the same rate as has been given for the first section, only 375 years would be required to erode this distance of 1,500 feet. The whirlpool belongs to the St. David's epoch, and will be considered in another connection.

The Cove section, or the part from the whirlpool to the narrows at Foster's Island, is 3,750 feet long. No one imagines the rate of the recession for this section to be different from that first named, as the width of the gorge and the depth of the water are the same. This would have required 937 years for its excavation.

Professor Spencer has calculated the age of the lower section of the gorge from Lewiston to Foster's Island to be 17,200 years, upon the assumption that the conditions would be those of the American falls. But measurements of the breadth below the Cove section give an average of width of

the top of the gorge, fully equal to that of the upper gorge as far as to the Catholic College, 5,754 feet, while the other part, 8,448 feet, may for convenience be comparable to the American falls. Calculations upon these bases give 1,438 years for the upper part, and 5,406 years for the lower, a total of 6,844 years.

The section from the beginning of the whirlpool to the edge of the escarpment, near St. David's, is about three miles in length. Its erosion was effected before the last ice-epoch, according to our interpretation, and some might say pre-glacial. It would appear that the volume of the water passing through was fully equal to that of the present epoch, and may have been derived from the same sources. At the rate of recession adopted for the greater gorge, the time must have been at least 3,960 years. This does not account for the greater width of the mouth of the gorge, which may have been either water-worn, or eroded by the ice-sheet.

The sum of the figures given above amounts to 18,918 years for the present gorge, to which might be added the figure for the St. David's channel—making in all 22,878 years.

Professor Spencer's estimate of the age, including the whirlpool, but not the St. David's channel, sums up 31,000 years, to which he adds a thousand years for the duration of the river before the advent of the falls. Sir Charles Lyell gave the figure of 36,000; Professor Warren Upham, 10,000, and F. B. Taylor would estimate it to lie between 36,000 and 50,000.

Other estimates of the age of parts of the gorge are based upon the alleged time required for the warping of the basins. Involving the correctness of suggested correlation, they cannot have the value of the direct estimates, but are useful by way of comparison. That presented by Dr. Gilbert of the age of the Nipissing outlet well illustrates the method employed. First of all came the determination of the fact of tilting, and its rate. Three pairs of stations were selected, one between Milwaukee, Wis., and Port Austin, Mich., connecting Lakes Michigan and Huron; another between Cleveland, Ohio, and Port Colborne on Lake Erie, and the third between Charlotte and Sackett Harbor, N. Y., on Lake Ontario. Bench marks were established, and accurate observations recorded of the height attained by the water each day for three months, in the summer of 1896. Care was taken to eliminate from the observed figures the levels affected by tides, seiches, storms, and the seasons. At some of the stations, observations had been made for many years, which were used for comparison. The general conclusion reached, was that there is a rise in the land from southwest to northeast, at the rate of 0.42 feet per century. Assuming this rate to have been uniform and secular, Dr. Gilbert estimates that the time when the drainage was shifted from North Bay to Port Huron must have been about 10,000 years. This, he would make to correspond with the date of the position of the cataract at the head of the whirlpool rapids.

Professor Spencer's figure, for the same date, is 7,800, as deduced from differential elevations. For the total length of time since the Algonquin Lake existed, which corresponds to the age of Niagara, Professor Spencer obtains the figure of 28,000 years.

Principal Events in the Niagara District.

It may be useful to summarize the various episodes in the geological history of the region of Niagara, as now delineated. In the not distant future, geologists may be able to give them value in centuries or years.

1. Laying down of the crystalline Archean floor, upon which the Cambrian and Lower Silurian terranes were deposited in order, before the dry land reached as far south as Lake Ontario.

2. Deposition of the Upper Silurian members of the series: (*a*) Medina clays and sands resting upon the raised Lower Silurian land, and extending from Lake Ontario to some distance south of the falls. (*b*) Clinton shale and limestone. (*c*) Niagara shale and limestone, both formed below the ocean's surface; coral reefs extensive. (*d*) Onondaga, or Salina, salt group.

3. Land gradually rising and attaining a considerable altitude at the close of the Paleozoic era. Subaerial denudation continued through later periods, during which time the basin of Ontario takes shape.

4. Age of Erigan River. Drainage of country from the Appalachian coal fields northerly, discharging through the Dundas Valley into Lake Ontario.

5. First ice age, that of the Cordilleras. Not certain that its influence was felt in the Niagara region.

6. Second ice age, the Keewatin. Blocking up of Erigan River. Ice moves southerly; its melting gives birth to Lake Erie.

7. Temperate epoch. Wearing of the gorge through the St. David's Channel, including the whirlpool, 3,960 years.

8. Accumulation of ice upon the Labrador highlands and its movement southwesterly, as far south as to the Ohio River, filling the St. David's Channel. Terminal moraines left as it recedes; one near Buffalo, and the next from Lockport across to Toronto.

9. Warren Lake, discharging at Chicago, occupying parts of Lakes Michigan, Huron, and Erie.

10. Algonquin Lake was composed of Lakes Superior, Michigan, and Huron discharging into the Ontario basin through Lake Erie, or by way of Balsam Lake and Trent River, and thence through the Mohawk into Hudson River.

Erie was tributary. The waters sank to the level of Lundy Lake, after which the Niagara River began its flow; accumulation of deposits with fluviatile shells.

11. Iroquois Lake, an expanse of Lake Ontario succeeded, discharging through the Mohawk. Beginning of the erosion of the lower gorge. River divided by the island below Wintergreen flat. Time of erosion 6,844 years.

12. Erosion of the Cove section requiring a river as large as the present Niagara. Breaking of the barrier at outlet of whirlpool. Time, 937 years.

13. Period of erosion of the gorge of the whirlpool rapids, when the water of Lake Erie alone was concerned. Outlet of upper lakes perhaps through Lake Nipissing. Time, 7,800 years.

14. Restoration of full volume of Niagara River. Upper great gorge excavated from the railroad bridges to the existing cataract. Time, 2,962 years.

Time since the water fell over the Niagara escarpment, 18,918 years. Between this epoch and the shifting of the Labrador ice-sheet from the Niagara River valley there intervened Lakes Warren and Algonquin (events 9 and 10), probably not of long duration. Nothing about Niagara gives us any clue to the duration of the Labrador ice-sheet. The time of the wearing of the whirlpool basin, 475 years, is not included in the estimate of the age of the general gorge.

NOTE.—A revision of the distances stated in the Table upon page 4 would make the length of the Whirlpool basin, including the Shoal ledge, to be 1,900 instead of 3,400 feet. The Cove section should be 3,750 instead of 7,000 feet; from Foster's Island to Catholic College 5,754 instead of 6,187 feet; Catholic College to the mouth of the gorge 8,468 instead of 4,813 feet.

THE ARCHÆOLOGY OF THE SOUTHERN INTERIOR OF BRITISH COLUMBIA.

BY HARLAN I. SMITH.

I. INTRODUCTION.

GEOGRAPHY, ARCHÆOLOGICAL SITES, AND RESOURCES EMPLOYED BY THE PREHISTORIC PEOPLE.

Our present knowledge of the archæology of the southern interior of British Columbia is largely based upon the work of two institutions: the Canadian Geological Survey and the American Museum of Natural History. The work of the former was conducted by Dr. George M. Dawson, who investigated the large burial-ground on the sand terrace, between the Fraser and Thompson Rivers, near Lytton, while engaged in geological work in southern British Columbia, during the years 1877 and 1888-90. The results are recorded in "Notes on the Shuswap People of British Columbia" in the Transactions of the Royal Society of Canada, Section II., 1891. The collections made by Dr. Dawson are in the Museum of the Geological Survey of Canada at Ottawa.

The work of the American Museum of Natural History, I conducted as a party of the Jesup North Pacific Expedition, which was sent out from the museum to investigate the anthropology of the north Pacific Coasts of America and Asia. Investigations were conducted during the years 1897 and 1898 as described in *Science* for April 14, 1899, and during 1899 as outlined in *The American Anthropologist* for July-September, 1900. The results, from which this paper is an extract, are published in detail with illustrations in Parts III. and VI. of Volume II. of the Memoirs of the museum, and the collections are preserved in the same institution.

The explorations were conducted at Spences Bridge and Kamloops in June, and at Lytton in July, 1897. In May 1898 and May 1899 these sites were revisited. In October 1899 an exploring trip was made from Spences Bridge, near the mouth of the Nicola River, to Nicola Lake. On this trip Mr. James Teit was of the party. The chiefs of all the Indian bands of the region rendered valuable assistance in carrying on the work.

Dieck, the botanist, collected some stone carvings from the region below Lytton. These are now in the Royal Ethnographical Museum at Berlin. Various individuals throughout British Columbia and the west possess cabinet specimens from the region, and in the Provincial Museum at Victoria, B. C., is a collection. These are the results of casual visits to the burial places near Lytton and Kamloops.

GEOGRAPHY.—Lytton is situated at the mouth of the Thompson River, below which the Fraser breaks through the Coast Range, forming a deep cañon. Above Lytton the Thompson, flowing through the plateau, has cut in its lower course a deep valley, which in some places is a true cañon. The climate is dry, and so vegetation is scanty, but on the high lands there is open timber. Greasewood, sagebrush and cactus are found here; bunch-grass grows on the hill-sides, and roots and berries are found in the mountain valleys. Bear and deer were plentiful in the vicinity. The salmon ascend both rivers to spawn. They are much used as food by the present inhabitants.

Spences Bridge is in the Thompson Valley, twenty-two miles above Lytton, and about a mile below the mouth of Nicola River. It is below Spences Bridge that the river forms a cañon; above it, the banks are comparatively low. The climate and natural resources resemble those of Lytton.

Kamloops is also in the Thompson Valley and is ninety-five miles above Lytton at the confluence of the north and south branches of the river. The bottom land here is wide and the surrounding country a rolling plateau. The altitude of the valley is about eleven hundred feet. The climate and natural resources resemble those of Lytton and Spences Bridge, but timber seems more scanty. The hill-sides are favorable for grazing. The Indians state that formerly great herds of elk inhabited these hills. The salmon ascend to this region, but not in such great numbers as to Lytton, as many that turn from the Fraser into the Thompson go up Nicola River and smaller streams. A few miles below Kamloops the Thompson widens into Kamloops Lake, where wild fowl and fish abound.

Nicola Valley near its mouth is deep and narrow, while at Nicola Lake it is high on the rolling plateau and similar to the region each side of the valley at Kamloops, which is about thirty-five miles to the north. The lake is about two thousand feet above sea level. The mouth of Nicola Valley, about eight hundred. The river is, consequently, rapid, and it is also shallow. The Indians of the valley have commercial intercourse with Kamloops to the north, the Okanagon to the east, Similkameen to the south, and with Lytton and Boston Bar to the west.

ARCHÆOLOGICAL SITES.—The main burial place and village site at Lytton is situated on the sand-hill that is found along a terrace between the cañons of the Fraser and Thompson Rivers, and immediately to the north of their confluence. This is by far the most important site near Lytton. The hill is about one hundred feet above the river, and is about five hundred feet in length by two hundred feet in width. A large pine tree is growing on the crest of the hill, in the middle of the burial place. An Indian trail passes to the west of the area, and the government road bounds it on the east. No definite age can be assigned to any of the remains secured, a

the wind, which sweeps strongly up the cañon of the Fraser River, is continually shifting the light, dry sand from place to place. It uncovers the graves, disarranges them, and sometimes re-covers the remains. Miners and Indians often camp at this site, and the objects left by them are scattered on the surface and often covered by the shifting sand. All these objects must be distinguished from the undisturbed burials of the prehistoric people. The surface is strewn with human bones which have been uncovered by the wind. There are also scattered about shell beads, wedges made of antler, scrapers and chipped points of stone such as were used for arrows and knives, grinding-stones, celts and other material similar to that found in the graves. There is a large box at this place in which the Indians deposit the bones and objects as they are uncovered by the wind, but sometimes they bury them. The bones they consider to be those of Indians, although they do not know whether they are of their own ancestors or not. It is reasonably certain, judging from the complete absence of European objects in the undisturbed graves, that they antedate contact with the whites. A number of them must be several hundred years old.

Extending to the north from the hill, and on the same terrace, were found old hearths, indicated by broken and crackled fire-stones, large slabs of grinding-stones, and remains of underground houses. A few human bones were secured from the edge of the gravel-pit made by miners near an Indian cemetary, known to be modern by the portions of the fence which still remain.

Southward from the sand-hill, on the level of the terrace, were found traces of similar hearths, charcoal, and rolls of birchbark partly burned. Here were also remains of underground houses. There were two large bowlders, which the Indians report were used in the ceremonials performed by young men, or by youths when reaching maturity. It is said that these youths were required to cover the distance from one bowlder to the other in a prescribed number of leaps.

About half a mile below Lytton, on the high gravel terrace on the east bank of the Fraser River, was found a second village-site. The Canadian Pacific Railroad cuts through this site.

A third village-site was located on the high terrace on the east bank of the Fraser River, about two miles north of Lytton. The place is a meadow in an open pine forest, east of the government road. South of it, is a small brook, ending lower down in a marsh. This may have determined the location of the site, since it affords a supply of fresh water high above the Fraser River.

A fourth site was on the east side of the Fraser, nearly opposite Stein Creek.

A fifth ancient village and burial place were located at the north side of the mouth of Stein Creek, which empties into the Fraser River from the west, at a point about four miles above

Lytton. This place is on the tableland overlooking the Fraser River, and near the present Indian village of Slame. Here were human bones, fragments of pecten shells, fragments of steatite pipes, and wedges of antler, scattered by the wind. On the lower terrace, close to Stein Creek, are remains of ancient houses, which measured from fifty to sixty feet in diameter.

Some attention was given to a sixth site, which is marked byburials and traces of habitations, on the low sandy terraces onthe west bank of the Fraser River, about opposite the main burial place. These sites may or may not have been occupied at the same time.

All through this region are evidences of prehistoric habitations, located at varying distances from the larger village-sites. This suggests that the mode of life of the prehistoric people was similar to that of the present Indians, among whom one or two families often live at some distance from the main villages.

At Spences Bridge a single grave was the most interesting site explored. It was located on the edge of the first terrace overlooking Thompson River from the north, about a quarter of a mile above the ferry. There are numerous old graves near by, on an island near the north bank of Thompson River, which the Indians did not wish us to explore; while they had no knowledge of the first grave, and assisted in exploring it. This grave contained no evidence of contact with whites. On the other hand, there is no positive evidence pointing to great antiquity. Fabrics that were buried with the body, and wooden posts in the surrounding soil, were still in a fair state of preservation.

About four miles above Spences Bridge, on the north side of the valley, are several pits surrounded by embankments, which mark the sites of ancient underground houses. Excavations in these pits resulted in finding broken bones of deer, bear, bison, etc., charcoal, burned and crackled stones, and other evidences of occupancy.

At Kamloops attention was directed particularly to the large burial place and camp-site on the Indian Reserve, on a low sandy stretch north of Kamloops Bridge. Except where held in place by an occasional sagebrush, the light yellowish grey sand is ever shifting over this site, so that the depth of the remains varies daily, and the original order of burial has been much disturbed. Burned and crackled bowlders hold in place conical piles of sand twenty to thirty feet in diameter. These are evidently the places where stones have been heated to be used in cooking roots, or for boiling food in baskets. Strewn over the entire site are found the bones of food-animals, stray bones from graves, burned and crackled fire-stones, and other objects, such as dentalium shells, copper beads, and flat oblong beads made of bone. The last named were usually found in little patches near traces of fires, and were frequently charred. Chipped points for knives, arrows, etc., wedges made of antler, and stone pestles or hammers were also discovered.

At intervals along the river-bank, from the western limit of this site to the Government Indian School, about two miles to the east, are remains of underground houses, which are most numerous near the school. They vary from fifteen to thirty feet in diameter, and close to them are traces of caches five or six feet in diameter. There are also remains of underground houses at the south end of the bridge.

The "Government Site" is located north of the slough, on a flat at the base of the foot-hills close to the school. Here the shifting sand has exposed the remains of cremated children, together with dentalium shells, flat oblong bone beads, and chipped cache forms of glassy basalt.

The "Government Hill Site" is located on the brow of the foot-hills leading to the mountains, about a hundred feet above the flat northwest of the school, and northeast of the large burial place.

The first whites to reach this vicinity were the Hudson Bay Company's agents, who built a block-house on the point west of the mouth of North Thompson River.

About two miles below this point, on the northern side of the river, is a wind-swept sand-knoll, where evidences of a village-site were found. Near the mouth of Tranquille River, on the north side of Kamloops Lake, above the red paintings on Battle Bluff, were evidences of still another village-site.

In Nicola Valley, about nine miles above the mouth and on the east side of the river, were a number of graves. The bodies had been placed upon the surface at the foot of a rock-slide or talus slope, and were covered by disturbing the slope sufficiently to cause rocks to slide down over them. These graves are usually marked by a few rocks piled upon them; but the pile is so low, that it is difficult to distinguish it from other parts of the talus slope. In some cases a branch was inserted among the rocks over the grave, and extended down to the body. One skeleton, resting upon the rock-slide, was in a lodge of poles, covered with mats made of the spike-stalk of the common cat-tail. The rock-slide had been worked down around the lodge to a height of about two feet over the skeleton. There were no objects found on the body or in the lodge. Another grave was without a lodge, but contained a celt and chipped basalt points.

At a point four miles farther up the valley, or thirteen miles from its mouth, is a rocky bluff called "Shooting Rock." At the southern base of it, is a talus slope in which are a number of burials marked by twigs. There are house-pits about a mile below this place, also about a quarter of a mile above it, and at various camping-places throughout the valley. They are so numerous that notes of all the sites were not taken. At some of them are cache-pits and saucer-shaped depressions, which mark sites of summer lodges. The former are deep, and surrounded by an embankment composed of the earth thrown out of the pit.

The graves of two children were explored on the terrace overlooking Nicola River from the south, at the mouth of Nicola Lake. These graves were about eighteen inches deep, and above each of them was a pile of five or six bowlders. Red pictographs were reported by the Indians to be on a rocky promontory which we saw near the middle of the lake, on its northern shore.

On the Indian Reserve, at the eastern limit of Nicola Lake, is an outcrop of rock in the Meander Hills. There are three main talus slopes between this knoll and the lake, in all of which were graves marked by sticks and twigs. Charlie Tcilaxitca, who is about sixty years of age and a brother of the chief of this reserve, related that when he first saw the place, it resembled a patch of small dead trees, so numerous were the twigs marking graves on the slope. The rocks were piled up over the graves, but the piles were so low that they were difficult to find, except when marked by twigs.

Resources Employed by the Prehistoric People.—The resources of the prehistoric people of this region, as indicated by the specimens found in the graves, hearths, and about the village-sites, were chiefly stone, copper, shell, bone, antler, teeth, the skins of animals, and vegetable substances.

Quartzite pebbles were used for scrapers, hammers, and similar objects. Quartz crystals were found in the sites, and may have been used for drills and charms. Argillite was made into fish-knives, points for arrows, etc. Glassy basalt, agate, chalcedony, and yellow, red, and green jasper were used for various kinds of chipped implements. The material commonly employed for the chipped objects, however, was basalt. Steatite was made into pipes, perforators, etc. Sheets of mica were made into pendants. Serpentine and nephrite into celts. Tons of stone were seen along the Fraser and Thompson Rivers, in this vicinity, of which samples prove to be nephrite. Bowlders of nephrite, resembling the same material from the Thompson River, were found by the writer on the beach at the mouth of Nootsack River, in the State of Washington. Flat pebbles of the same material, sharpened and partly cut into strips to form celts, were also found. It seems that these bowlders are widely distributed, and that where found they were used for making implements.

Siliceous sandstone of a rather coarse structure was used for making smoothers for arrow-shafts, for stones for grinding grooves into nephrite and serpentine in order to cut it into convenient forms for implements, and for grinding-stones. Copper clay was used for blue paint, and white, calcareous and yellow earth and red ochre, for paint of those respective colors. Red ochre occurs in this vicinity.

Fragments of rock bearing galena were found at Kamloops. Copper was much used for ornaments, and may have been obtained from the mountains north of Lytton, where native copper is found.

Many evidences of animals, probably used for food, or materials for clothing and implements, were found in the village-sites and burial-places. Bone of the whale was imported from the seacoast, and made into war-clubs. It is possible that it was imported through the Chilcotin country, from the region north of Vancouver Island. This is further emphasized by the absence of clubs of this character along lower Fraser River.

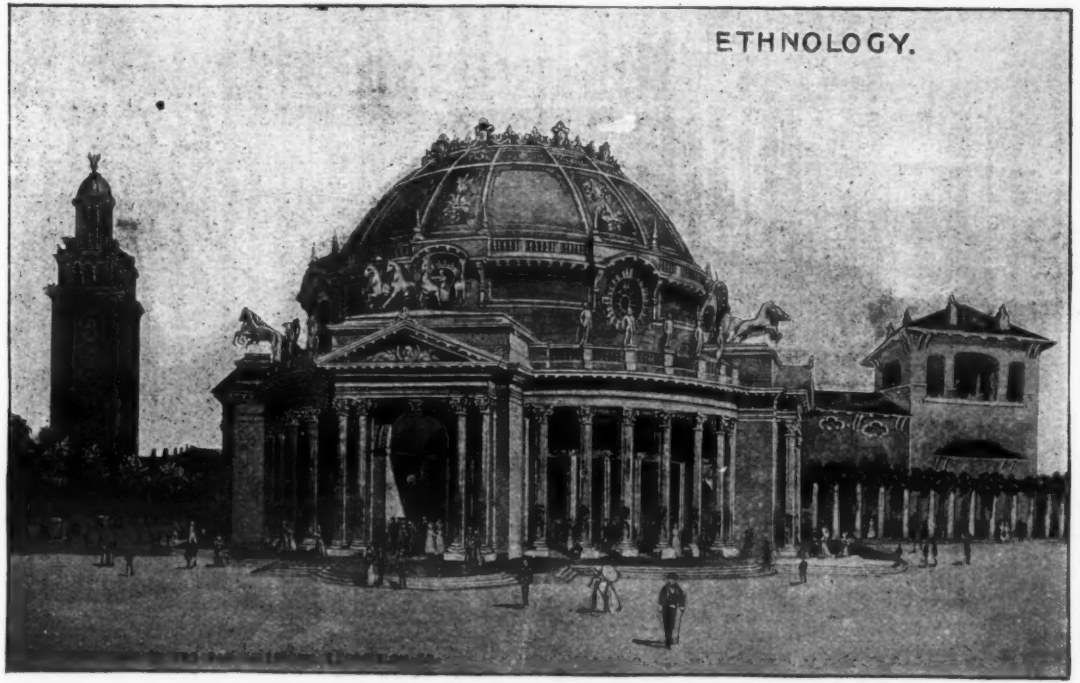
The pecten shell was found, but no olivella-shell objects were seen above Lytton. It seems that the use of dentalium shells was much more extensive in the interior, than it was in prehistoric times in the delta of the Fraser River, and they, like the bone of the whale, probably came from the sea by a northern route. Shells of the fresh-water clam were found in little patches, about three feet in diameter, at the four largest sites at Kamloops, in sufficient numbers to indicate that this animal was used for food.

Vegetable substances include charred pieces of wood from the hearths, and other charred fragments, which had probably been portions of canoes, tent-poles, etc., that were found around graves and in various parts of the village-sites. Pieces of wood were found rolled in copper, and preserved by the action of the copper salts.

Birch bark, charred or preserved by the dryness of the climate, was found in the graves as lining or covering, and in the form of rolls. Probably it was also used for dishes. A kind of gum, that was found in a shell spoon and on a bone handle for a stone knife, resembles that from the fir and pine. Digging-stick handles indicate that roots were dug for food.

Fragments of matting made of cat-tail stalks, fabrics of sagebrush-bark, fibre of cedar and charred bearberries, were found in the graves.

The bones of the whale, and varieties of shell above mentioned, were imported from the seacoast, by intertribal trade, or by expeditions for the purpose; and these formed an important addition to the natural resources of this interior region.


ETHNOLOGY.

TOLTEC CITIES AND TOLTEC CIVILIZATION.

BY STEPHEN D. PEET, PH. D.

The term Toltec has been regarded as a synonym of all that was refined and cultivated among the prehistoric races of Mexico and Central America, and is generally suggestive of a high state of civilization. This use of the word has, however, been objected to by many writers as giving an exaggerated idea of the progress of the people. Some have gone so far as to deny that there ever was a separate tribe. Dr. Brinton maintained that the name Toltec was a title of distinction, rather than a national or tribal name, and was never applied to the common people. Mr. L. H. Morgan and Mr. A. F. Bandelier maintain that there was no such state of civilization as is suggested by the name, either in this region or anywhere on the continent. What appears to be such, was only a varied form of barbarism; the so-called cities, which the Spaniards saw and the historians described, were little more than tribal villages; the kings were little else than tribal chiefs. The priests, who officiated at the ceremonies in the temples and who sacrificed human victims upon the summit of the pyramids, were not essentially different from the "medicine men" of the aborigines. Everything described by the Spanish historians as so superior, owes its magnificence to the imagination of the writers, or to their purpose to produce an effect upon the minds of the Europeans. There is very little that was real or truthful in these descriptions.

According to this school much that was written by the Spanish historians is to be rejected, and even the works of the American historians, such as Mr. W. H. Prescott, Mr. H. H. Bancroft, and others, were too much influenced by the exaggerations of the Spanish writers, and are too imaginative and visionary to be accepted.

The pendulum, however, has begun to swing in the other direction. The destructive criticism has given place to the constructive, and all are now willing to accept the statements which are made, making allowance for the circumstances and the times. The exaggerations of the Spanish historians have been trimmed off, the solid facts have come forth, and it is now admitted that after all, there was in Mexico and the Central provinces of South America, as well as in the United States of Colombia and among the mountains of Peru, evidence of civilization, which may well be compared to those which existed in many parts of the old world, at the beginnings of history, especially in India, Mesopotamia, the valley of the Nile, and perhaps in China.

There was, however, this difference between the cities of America and those of the East: these were originally the abodes of clans and tribes, but some of them were becoming subordinate to others, and so were divided into two classes—the ruling and the serving; while the cities known to history, were the seats of an empire and abodes of a despot. On this point Mr. E. J. Payne, the author of the "History of the New World Called America," says:

> The pueblo, in its simple form, possesses no historical importance. History in the ordinary sense, only begins when the pueblo has become the unit of a compound society, consisting of several such united units aggregated into a group, held in subjection by some larger and stronger one; one of a class which may be called "dominant" or "sovereign" pueblos.
>
> In denominating the pueblos by which others were held in subjection, "dominant" or "sovereign" pueblos, the name given to them by the Mexicans (Tlatocaaltepetl) is exactly reproduced.
>
> Here, alone among the advanced tracts of the New World, we find chiefs belonging to the conquering tribes established as resident proprietors in the conquered pueblos. The Spaniards rightly compared these proprietary estates, which seem usually to have comprised the greater part of the village lands, to the seigneuries of Europe. The remarkable analogy to a familiar element in the advancement of the Old World is wholly wanting in Peru.*

This is virtually the position which Dr. E. B. Tylor takes, in his admirable work, "Anahuac; or, Mexico and the Mexicans, Ancient and Modern." He says that "the highest grade reached anywhere was barbarism without iron or the alphabet, but in some respects simulating civilization."

Miss Susan Hale, who has written a book upon Mexico, enters a gentle protest against the severe tendency of the critics, and laments that they, "with the fatal penetration of our time, destroy the splendid vision which was drawn by the Spaniards, and which resembled the glories of an oriental tale; reducing the emperor to a chieftan, the glittering retinue to a horde of savages, the magnificent palace to a pueblo of adobe. The discouraged enthusiast sees his magnificent civilization, devoted to art, literature, and luxury, reduced to a few handfuls of pitiful Indians quarrelling among themselves for supremacy; and sighs to think his sympathies may have been wasted on an Aztec sovereign, dethroned by the invading Spaniard."

Later explorers, M. Désiré Charnay, Mr. and Mrs. Maudsley, Mr. W. H. Holmes and M. H. Saville, do not follow the Spanish historians, but by their descriptions they show that the cities were far more magnificent than any ordinary Indian pueblo could be, and contained many fine specimens of art and architecture. The cities, in fact, show a grade of civilization which was quite equal to that which prevailed in the East at the opening of history. They are scattered over a wide region of country, some of them in Mexico, some in Guatemala, Nicaragua, and Honduras; those in Mexico having been erected

* "History of America," Vol. II., page 51

at different periods and by different tribes of the great Nahua race.

These cities are to form the subject of the present chapter, especially those which have been ascribed to the Toltecs, for we maintain that there was a great difference between the Toltec cities and those which preceded and followed; and they may be taken as certainly furnishing the best specimens of art and architecture to be found in Prehistoric America. There may be some who will deny this, and who will refer to the Maya architecture as superior; but there was so much difference between the two styles that they cannot very well be compared. The superiority of the Toltec architecture, in some particulars, can be easily shown, while that of the Mayas in others will be readily granted.

The Toltecs built many high pyramids, arranged in quadrangles, for foundations of their temples and palaces, but the buildings were of perishable material and have disappeared. The Mayas built terraced platforms which were broad and spacious, and erected their palaces and temples upon these, but always used stone as the building material. They frequently ornamented the façades with elaborate figures carved upon the stone. These figures consisted sometimes of massive serpents and sometimes of conventional ornaments.

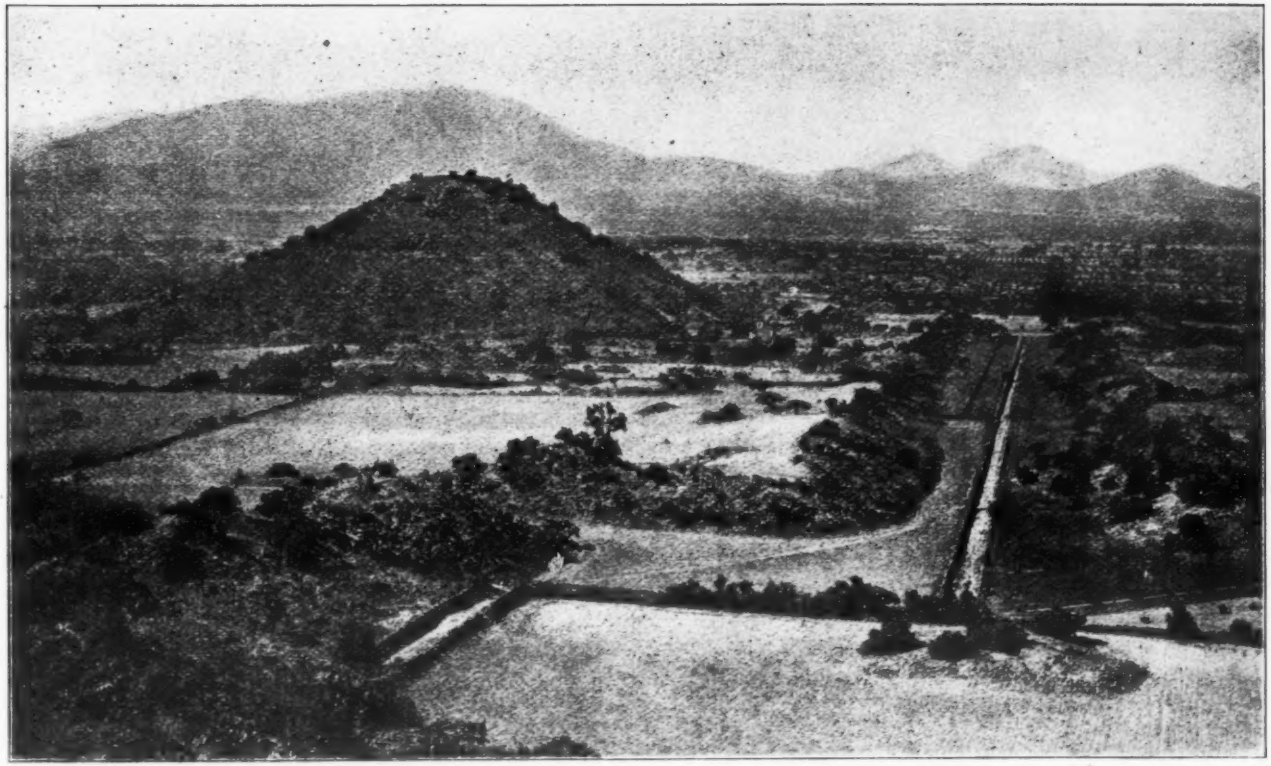
Matthew's says in his book on Architecture:

> Palaces and temples are the main survivals of native art. The palaces, as a rule, were low, one-story buildings, without windows, rising above one or more terraces. Each was composed of a stone basement, surmounted by a species of attic, carved in imitation of reeds and decorated in high relief with scrolls, monsters, and masks, such as are used on the prows of battle hips among the Polynesian Islanders. The roofs were flat and the rooms were lighted only from the doors.

The point which we desire to bring out, is that there was a Toltec architecture which was as distinctive as was ever the Etruscan, the Mycenæan, the Persian, or the Babylonian; and the term may be ascribed to it, without deciding whether there was any particular tribe or people called by that name. The significance of the name is, that it expresses that stage of civilization which was reached at an early date in America, and which may well be compared to that which prevailed in the countries of the East many thousands of years before.

I. The first point which we shall bring up is that there were, in Mexico, certain tribes which were of a superior character and which showed a fair degree of civilization. The origin of these tribes, as such, has not been discovered, but Mr. Bancroft has given a valuable history of them, of which the following is a brief summary:

> The history of the native races may be most conveniently subdivided, as follows: 1st. The Pre-Toltec period, embracing the semi-mythic traditions of the earliest civilization, extending down to a date—always preceding the sixth century, but varying in different parts of the territory—when the more properly historic annals of the different nations begin, and



SAN JUAN TEOTIHUACAN FROM THE PYRAMID OF THE MOON.
Courtesy of the Field Columbian Museum.

including also the few traditions referring to pre-Toltec nations north of Tehuantepec. 2nd. The Toltec Period, referring like the two following periods to Anahuac alone, and extending down to the eleventh century. 3rd. The Chichimec Period, extending from the eleventh century to the formation of the tri-partite alliance between the Aztecs, Acolhuans, and Tepanecs in the fifteenth century. 4th. The Aztec Period, that of Aztec supremacy during the century preceding the Conquest.

* * * * * * *

The old-time story, how the Toltecs in the sixth century appeared on the Mexican tableland; how they were driven out and scattered in the eleventh century; how after a brief interval the Chichimecs followed their footsteps, and how these last were succeeded by the Aztecs, who were found in possession,—the last two, and probably the first, migrating in immense hordes from the far Northwest,—all this is sufficiently familiar to readers of Mexican history.

* * * * * * *

Tradition imputes to the Toltecs a higher civilization than that found among the Aztecs, who had degenerated with the growth of the warlike spirit, and especially by the introduction of more cruel and sanguinary religious rites. But this superiority, in some respects not improbable, rests on no very strong evidence, since this people left no relics of that artistic skill which gave them so great traditional fame; there is, however, much reason to ascribe the construction of the pyramids at Teotihuacan and Cholula to the Toltec, or a still earlier period. Among the civilized peoples of the sixteenth century, however, and among their descendants down to the present day, nearly every ancient relic of architecture or sculpture is accredited to the Toltecs, from whom all claim descent.

During the most flourishing period of its traditional five centuries of duration, the Toltec empire was ruled by a confederacy similar in some respects to the alliance of the later date between Mexico, Tezcuco, and Tlacopan. The capitals were Culhuacan, Otompan, and Tulan, the two former corresponding somewhat in territory with Mexico and Tezcuco, while the latter was just beyond the limits of the valley toward the northwest. Each of these capital cities became in turn the leading power in the confederacy. Tulan* reached the highest eminence in culture, splendor, and fame; and Culhuacan was the only one of the three to survive by name the bloody convulsions by which the empire was at last overthrown, and retain anything of her former greatness.

* * * * * * *

Before the Chichimec invasion, Cholula had already acquired great prominence as a Toltec city, and as the residence of the great Nahua apostle Quetzalcoatl, of which era, or a preceding one, the famous pyramid remains as a memento.

The coast region east of Tlascala, comprising the northern half of the State of Vera Cruz, was the home of the Totonacs, whose capital was the famous Cempoala, and who were conquered by the Aztecs at the close of the fifteenth century. They were probably one of the ancient pre-Toltec peoples, like the Otomis and Olmecs, and they claimed to have occupied in former times Anahuac and the adjoining territory, where they erected the pyramids of the sun and moon at Teotihuacan. Their institutions, when first observed by Europeans, seem to have been essentially Nahua, and the abundant architectural remains found in Totonac territory, as at Papantla, Misantla, and Tusapan, show no well-defined differences from Aztec constructions proper.†

We learn from these descriptions that there were many Toltec cities scattered through the provinces of Mexico, the most of which are now in ruins; but from the ruins, the characteristics of the Toltec architecture can be discovered.

*The ruins of Tulan were discovered by Monsieur Desire Charnay, and are described in his interesting book on "The Ancient Cities of the New World," pages 103 to 112.

† Bancroft's "History," Vol. II., pages 113 and 114.

These ruins have been examined by various explorers and have proved to contain many elements of architecture which resembled those found in the ancient cities of the Mayas of Central America.

A description of these cities has been given by the different archæologists, whose names have been mentioned above, and photographs, panoramas, and diagrams have been taken of them; so that we may now easily compare their arrangements, their architectural features, and their various peculiarities with those which prevailed in other countries of the East, as well as those in Central America.

II. Among the elements which constitute the chief factors in these cities, we may mention, first, their division into parts resembling wards, each part having a central temple; all the parts arranged around the palace and the temple, which were the seats of authority for the ruling classes, who corresponded to the kings and priests in Oriental countries. In some of the cities, orientation was manifest, the sides of the temples being directed to the points of the compass. The stairways which reached the temples faced the four quarters of the city. The arrangement of these cities around the palaces and temples, shows that society had passed out from the village life and the clan-organization, into a stage in which a certain class had usurped a power over the other classes, and had elevated the central village into supremacy over other villages; making the whole agricultural country surrounding tributary to the city, and subject to the control of the chiefs, who had assumed the position of a king, the power of the monarch being supplemented by the priests.

This arrangement of the cities in America resembles that which was common in the Oriental countries, and differed entirely from that which prevailed in the villages of the north. The following are the particulars in which the resemblance is very close:

We find in Babylonia that there was, at a very early date, a geographical division, which arose partly from their religious system and partly from their social organization. Rev. O. D. Miller says:

> In the system of symbolical geography which centered in Akkad, the capital of the country ruled by the ancient Sargon, we find a peculiar arrangement, properly illustrated by the figure, the inclosed square facing the cardinal points—denotes the position of the city as situated precisely in the centre of the world and surrounded by four other countries, located in the direction of the four cardinal regions. Dr. Bahr calls this the ancient "cosmos" or "macrocosm." The number 5 in the centre of the square symbolized the "soul of the world," while the other numbers denoted the various elements—four male and four females.

—	1	—
4	5	2
—	3	—

M. Lenormant says:

> To find the origin, it is necessary to go back to the common source of primitive tradition respecting the terrestrial Paradise considered as a plateau of a square figure, having its sides turned to the four cardinal

points and surrounded by the four other countries facing the cardinal regions.

Dr. Bahr says:

It is a conception common to all the ancient nations, and inseparable from their notion of God—to represent the world as a building or house to the Deity, and the Heaven as his especial dwelling. The Universe is the real, true Temple, built by the Deity himself, and this, as the original Temple, constituted a model the archetype of all those constructed by man.

The Chinese have a similar arrangement of the division of their cities, as they place the throne of the Emperor at the centre, and the temples at the corners.

The division of China into nine provinces and the symbolical conceptions connected with them, date from a high antiquity, and really comes from orientation. It springs very naturally from the doubling of four and making the throne the centre of the diagram, with eight squares.*

The "Celestial Earth" and the "Crown of Heaven," which are terms common among the Chinese, are exactly the same as the old Accadian expressions which were used in Babylonia. The primitive character of the pyramid temple is seen in that it was called the foundation of the "Celestial Earth," but represented the "Sacred Mountain," which was supposed to unite the Heaven and Earth like a vast column or pyramid; this mountain, rising in immense terraces until its summit reached the Heaven, was supposed to be the pivot of the skies.

In Mexico, the ancient cities were oriented in the same way, but they seem to have controlled a limited territory, rather than an entire empire. There was, however, this peculiarity about them, they ruled over the surrounding region, and made it tributary to the city and subject to the control of the king and priests

It has been shown, by Miss Nutall, that the priests directed the employments of the agricultural people according to the calendar, which they studied and interpreted as containing the commands of the chief divinities, who were only the nature powers personified. By this means all agricultural employments and all trade, as well as all social customs and domestic affairs, were regulated by the calendar. This, of itself, makes the architecture of the ancient cities very significant, for the temple in which the calendar stone was kept was the seat of as much power as the palace itself.†

There are strong indications proving that the different branches of industry or pursuit are identified with certain day signs. There was a division of products into four categories, according to the elements with which each industry or pursuit was connected; that on the market days of Catl, the god of water, aquatic or vegetable products; on Tecpatl (flint) days,

* See THE AMERICAN ANTIQUARIAN, Vol. III., page 113.

† See "Native American Symbolism," page 428; chapter on "Ancient Codices and Calendar Stones."

VIEW LOOKING EAST ALONG THE PATHWAY OF THE DEAD.
Courtesy of the Field Colnmbian Museum.

mineral products; on Calli (house) day, all manufactured articles; on Tochtli (tiger), all products of animal life should predominate in the market place.

It is maintained that there were gardens filled with trees and plants, and menageries for all kinds of wild animals, with cages for birds, in Mexico, and that the king was attended with a great retinue of servants, that his garments were highly wrought and were new each day. Gold and silver were abundant.

There are no actual proofs that these things existed in the Toltec cities, yet, judging from such specimens of art as have been discovered and from the size and character of the ruins of the cities, we conclude that all of these evidences of civilization prevailed among the Toltecs.

The ruins of acqueducts have been discovered near the City of Mexico. Acqueducts have been also recognized near the cities of Peru. No such works have been discovered in connection with the Toltec cities, yet it seems probable that they prevailed.

The division of labor and the differentiation of architecture are factors which can be recognized in the history of the Toltecs. It is plain that the people had passed from the pastoral into the agricultural state, and that the villages had grown into cities, and that there were artisans as well as rulers in the cities.

Ihering says: "No nation devoted to agriculture, but ultimately builds up towns which accomplish much in the way of promoting culture. The agriculturalist of remote ages, provided all his own necessaries, but the course of man's industry gave rise to certain handicrafts which required special skill."

The arrow-maker was the first artisan, then the pottery maker, then the basket-maker and the weaver of cloth. Afterwards there would be the silversmith, the stone-mason, and the carpenter: finally, the architect. These would naturally gather into the towns and cities. We learn from history that paper was manufactured and that many finely wrought articles of gold, silver, and copper, were common in Mexico at the time of the Conquest. There is no doubt that all of these industries were carried on by the Toltecs.

This fact throws much light upon the ancient customs of the Toltecs, and makes the resemblance between the ancient cities of America and those of Babylonia all the more striking.

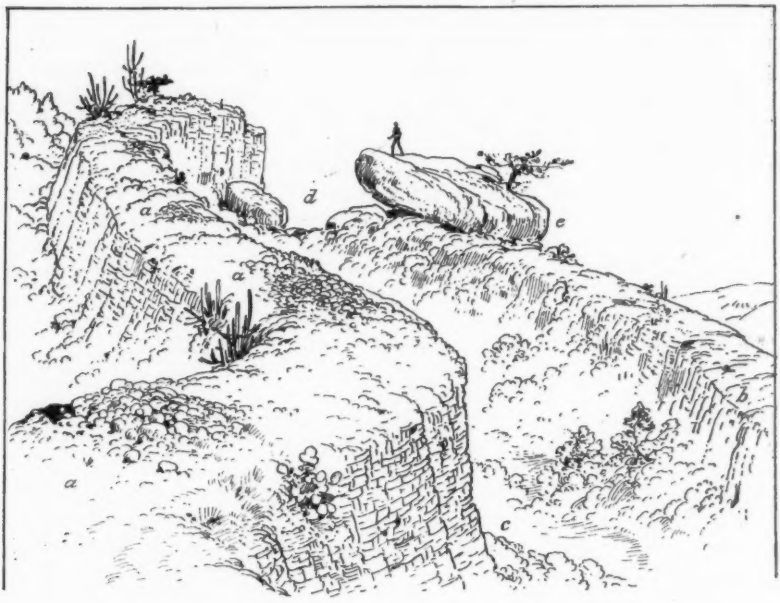
We are to notice however, in connection with these cities, that there were roadways, which extended from their centre in different directions to the agricultural country surrounding, and these became important thoroughfares, but ended at the temple and at the palace.

Descriptions have been written of the roadways in the City of Mexico by Prescott and other historians. These extended across the lakes, and separated the fresh water from the salt water and formed great causeways, which connected the island city with the shores of the lake, and so with the neighboring

cities. There were, however, other cities in Mexico, Central America, and even in Peru, which were the seats of empire and which were reached by roadways which were even more skillfully wrought and carefully attended than those of Mexico.

There were also, as we have seen, remarkable gateways in this region, to which the name of "Toltec Gates" has been given. These gateways were to be sure generally connected with fortresses, but they differed so much from those of the temples of Mexico and of the cities of Peru, as to be distinctive.

One such gateway has been described by Mr. W. H. Holmes as situated near Mitla; other similar gateways were common



TOLTEC GATE. FORTIFICATION, NEAR MITLA.

a, a, a. Inner wall with heap of stones intended for use in defense. b. Outer wall. c. Space between walls. d. Gateway. Height of walls from 10 to 16 feet.

among the Mound-Builders of Ohio. They consisted in the overlapping of the walls of the fort in such a way, as to make a narrow, crooked passage, exposed to the missiles of those who might stand upon the walls.

The most interesting city is Quemada, situated in southern Zacatecas, not far from the northern border of Mexico. This city has long been in ruins, but was probably built by the Toltecs, a race which preceded the Aztecs and are supposed by some to have abandoned the region at the advent of this wild tribe, which came from the North, and finally settled in

the valley of Mexico and usurped the power over all the neighboring tribes. A description furnished by Mr. Bancroft was drawn from some of the early explorers, and is very important, for it shows the similarity between this ancient city and the city of Teotihuacan, which has recently awakened so much interest, because of the number of ancient pyramids contained in it, and especially because of the ancient roadway to which the name "Path of the Dead" has been given.

The following is Bancroft's description of Quemada: "The most important of famous ruins of the whole northern region are those which are known to the world under the name of Quemada, in southern Zacatecas. The ruins are mentioned by the early writers as one of the probable stations of the migratory Aztecs. The early name is "Los Edificios."

Sr. Gil says: "These ruins are the grandest among us after those of Palenque, and on examining them, it is seen that they were the fruit of a civilization more advanced than that which was found in Peru at the time of the Incas, or in Mexico at the time of Montezuma."

Bancroft describes the situation, and says:

The Cerro de los Edificios is a long, narrow, isolated hill, the summit of which is over half a mile in length from north to south, and 100 to 200 yards wide, except at the northern end, where it widens out to about 500 yards. The height of the hill is given by Lyon as from 200 to 300 feet, but by Burkhart at 800 to 900 feet above the level of the plain. In the central part is a cliff, rising about thirty feet above the rest of the plateau. From the brow the hill descends more or less precipitously on the different sides, for about 150 feet, and then stretches in a gentler slope of from 200 to 400 yards to the surrounding plain. On the slope and skirting the whole circumference of the hill, except on the north and northeast, are traces of ancient roads crossing each other at different angles, and connected by cross roads running up the slope with the works on the summit.

One of the roads has traces of having been inclosed or raised by walls, whose foundations yet remain; and from it at a point near the angle of the raised causeway, 93 feet wide, extends straight up the slope northeastward to the foot of the bluff. From a point near the junction of the road and causeway, three raised roads, paved with rough stones, extend in perfectly straight lines southwest, and southwest by south. The first terminates at an artificial mound across the river. The second extends four miles to the Coyote Rancho, and the third is said to terminate at a mountain, six miles distant.

Two similar roads, thirteen or fourteen feet wide, extend from the eastern slope of the hill; one of them crossing a stream and terminating at a distance of two miles in a heap of stones [shrine?].

The most numerous and extensive ruins are on the southern portion of the hill, where the part of the uneven surface is formed into platforms, or terraces, by means of walls of solid masonry; the whole structure being twenty-one feet wide, and of the same height. On the platforms thus formed are a great number of edifices in different degrees of dilapidation.

On the lower part of the mesa, near the head of the causeway, is a quadrangular space, measuring 200 x 240 feet bounded by a stone terrace, or embankment, four or five feet high and 20 feet wide. At one point, on the eastern terrace, stands a round pillar, 19 feet in circumference and of the same height as the wall—18 feet. There are visible traces of nine other similar pillars, seemingly indicating the former presence of a massive column-supported portico. Within the walls of the inclosure, 23 feet from the side, 19½ feet from the ends, is a line of 11 pillars, each 17 feet in circumference and of the same height as the walls. There can be little doubt that

these columns once sustained a roof. The roof was made of large, flat stones, covered with mortar and supported by beams.

In another place we have a square inclosure similar to the one described. Its sides are 150 feet, bounded by a terrace 3 feet high and 12 feet wide, with steps in center of terrace of each side. Back of the terrace, on the east, west, and south sides, stand walls 8 or 9 feet in thickness and 20 feet high. The north side of the square is bounded by the steep side of the central cliff, in which steps or seats are cut in some parts in the solid rock, and others built up with rough stones. In the centre of this side, and partially on the terrace is a truncated pyramid, with a base of 38 x 35 feet, and 19 feet high, and divided into several stories. In front of the pyramid, and nearly in the center of the square, stands a kinds of altar or pyramid, seven feet square and five feet high. A very clear idea of this altar is given in the cut. It presents an interior view, from a point on the southern terrace—the pyramid in five stories, the central altar, the eastern terrace with its steps, and standing portions of the walls are all clearly portrayed.

Bancroft says further:

The ruins of Quemada show but few analogies to any of the southern remains, and none whatever to any that we shall find further north. As a strongly fortified hill, bearing also temples, Quemada bears considerable resemblance to Quiotepec in Oajaca; and possibly the likeness would be still stronger, if a plan of the Quiotepec fortifications were extant. The massive character, number, and extent of the monuments show the builders to have been a powerful and, in some respects, an advanced people, hardly less so, it would seem at first thought, than the people of Central America; but the absence of narrow buildings, covered by arches of over-lapping stones, and of all decorative sculpture and painting, make the contrast very striking.

The pyramids, so far as they are described, do not differ very materially from some in other parts of the country; but the location of the pyramids shown in the drawing and plan, within the inclosed and terraced squares, seems unique. The pillars recall the roof structures of Mitla, but it is quite possible that the pillars of Quemada supported balconies, instead of roofs. The peculiar structure, several times repeated, of two adjoining quadrangular spaces inclosed by high walls, one of them containing something like an altar in the center, is an important feature.

While Quemada does not compare, as a specimen of advanced art, with Uxmal and Palenque, and is inferior, so far as sculpture and decoration are concerned, to most other Nahua architectural monuments, it is yet one of the most remarkable of American ruins, presenting strong contrasts to all the rest, and is well worthy of a more careful examination than it has ever yet received.*

Now, we have dwelt on this description of Quemada, because of its resemblance to the ancient cities of the Mayas, such as Palenque, Uxmal, and Chichen-Itza. The city seems to have contained a fortified citadel and temple, very much as the Eastern cities did; the paved causeways may be regarded as the principal streets, on which the habitations of the people were built of perishable material, and in this respect reminding us of the City of Mexico. The platforms, pyramid, and altar resemble those at Palenque. The rectangular courts are similar to those which were common in all the ancient cities of this region.

The presence of columns at this ruin of Quemada is important, for the same features are prominent in the ruins at Mitla, a city situated at the extreme southern limits of Mexico,

*See Bancroft's "Native Races of the Pacific Coast," Vol. IV., page 502.

as Quemada is near the northern limit. This shows that a style of architecture prevailed during the Toltec period throughout this entire province, and that nearly all the cities contain about the same elements. The ornamentation of the walls at Mitla is very different from any that was discovered in the other ruins, and yet the city of Xochicalco has a building whose façade is covered with grotesque ornaments, which, perhaps, show as much skill and culture as that shown at Mitla.

III. The comparison between this ruined city and others which have been ascribed to the Toltecs will be, perhaps, suggestive. The first city which comes to notice, is Teotihuacan, which Mr. W. H. Holmes has explored and has published a description of in the Report of the Field Columbian Museum. The following is his account:

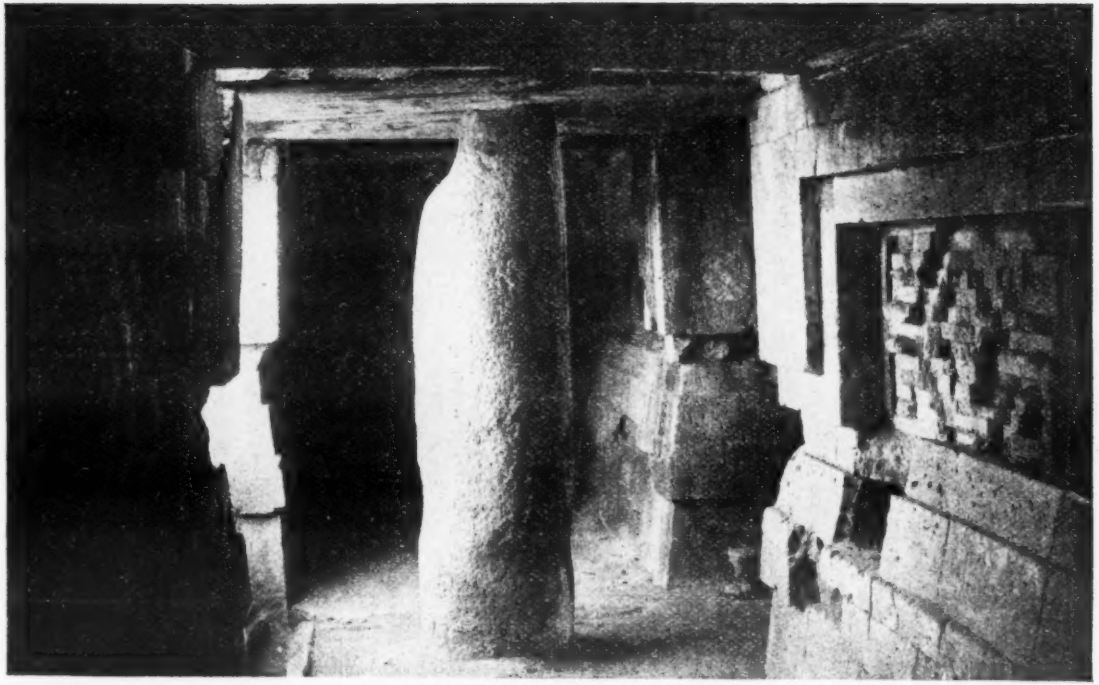
In the magnitude of its remains, and in the evidence the site furnishes of population and antiquity, Teotihuacan stands easily at the head of the ancient cities of Mexico. The bulk of the great cluster of pyramids, terraces, and mounds is far in excess of that of any other group of remains. Cholula has a greater pyramid, but lacks the multiplicity of attendant structures, which at San Juan cover square miles of ground. If the entire mass of the ruined structures of either Chichen-Itza, Uxmal, or Mitla was to be heaped up in a single mound, it would hardly surpass the great pyramid of the Sun alone in bulk, and the whole bulk of the Teotihuacan remains is many times that of its chief pyramid. Of the history of this great center of population and culture, we have hardly a trace, save that furnished by the remains themselves. The building of the city has been attributed to the Toltecs, but we cannot safely say more than that the builders were probably one of the numerous Nahuatl nations. The art remains indicate a culture differing decidedly from that of Tenochtitlan, the Aztec capital, now the capital city of Mexico, differing from it in so many ways, as to warrant the inference of a distinct nation.

In the laying out of Teotihuacan there is more evidence of foresight, than in most of the ancient cities. Though the orientation is not accurate —showing an error of about fifteen degrees—the important features are arranged in more or less complete harmony above a great artery-like thoroughfare called "The Camino de los Muertos," "The Pathway of the Dead."

The two great pyramids stand in a class by themselves, entirely overshadowing the multitude of piles that cover the plain. These pyramids, as well as other pyramidal masses, were probably substructures for buildings. All were truncated and ascended by stairways, and the sides of the loftier were generally terraced.

The Pyramid of the Moon occupies the immediate foreground in the panorama, A, and though now somewhat rounded in contour, from crumbling above and accumulation of débris below, the original form was evidently that of a rectangular, truncated pyramid. The base of the mound measures about 450 feet from north to south, and 500 feet from east to west; the truncated summit is not far from 50 x 60 feet. The sides sloped originally at an angle of about 45 degrees, and were interrupted by narrow terraces, now barely traceable. Early visitors mention the occurrence of remnants of a stairway on the east side, and indefinite references are made to a building on the summit. The summit commands a splendid view of the ruin group, and in the palmy days of the great city the spectacle from this point must have been imposing indeed.

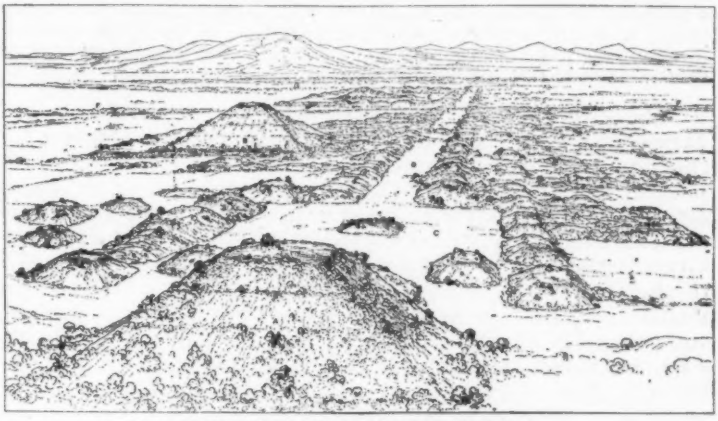
The vast mound of the Pyramid of the Sun, B, surrounded by its associated remains, is the most imposing structure in America. With its rounded outlines and the massiveness of a natural hill, it yet presents on close inspection clear indications of its former wholly artificial and symmetric character. It is a truncated pyramid, nearly 180 feet high above its



BASEMENT GALLERIES AND COLUMNAR ROOF SUPPORT AT MITLA.
Courtesy of the Field Columbian Museum.

immediate base, and, perhaps, a little more than that above the floor of the Pathway of the Dead, or the general level of the plain. It is about 700 feet square at the base, though the measurements given are hardly more than estimates, as the lower parts are covered with vast accumulations of débris. The slopes did not vary greatly from 45 degrees, though now appearing much less than that. Terraces are still seen at three levels: that on the west side, facing the Pathway of the Dead, occurs nearly midway in the slope, and is between 20 and 30 feet wide; the others are quite narrow. The summit is not far from 100 feet square, but is now too much broken down to be accurately measured. Remains of a zig-zag stairway are said to have been observed on the east face, but as with the other pyramid, analogy would lead to the surmise that the real stairway was on the west side, thus giving a more direct descent from the summit temple, which we assume must have existed, to the great central artery of the city.

An important feature of the ancient city was the great Court of the Battered Goddess, lying at the south base of the Pyramid of the Moon and opening into the Pathway of the Dead. It is 600 or 700 feet square, and is surrounded by a line of imposing mounds, above which, on the north, towers the Pyramid of the Moon. Near the centre is a low mound, the



PANORAMIC VIEW OF TEOTIHUACAN.

wreck of an inferior pyramid, whose position would indicate that in former days it probably had an important part to play in the affairs of the city

Opening out of the great court to the south is the so-called "Pathway of the Dead." A depressed way, varying from 200 to 300 feet in width and extending a little west of south (15 degrees) to the Arroya of the Rio San Juan, and continuing beyond into the fields surrounding the modern village, a distance of nearly two miles. Though this pyramid bordered way presents the appearance of a roadway, it is not truly a thoroughfare, being crossed by low embankments and interrupted by pyramids at several points. The name given appears to have no particular significance, yet it serves in a way to express the idea, suggested to all minds, that this pathway, in connection with the court, must have been the scene of no end of rites and pageants in which human sacrifice was possibly a central feature.

The South Side Group or Citadel. The great quadrangular group named and the citadel, E, lies on the east side of the Pathway of the Dead, 500 or 600 feet south of the banks of the Arroya. It consists of a rectangular inclosure, about 1,350 by 1,400 feet in extent, measured around the exterior base. The embankment is from 100 to 180 feet wide, and from 10 to 20 feet in height; the four sides are surmounted by lines of mounds, four on a side, placed somewhat unsymmetrically near the altar margin. Within the court, near the east side, stands a pyramid, perhaps 200 feet

square at the base, and 60 feet high, having a projection or terrace built against the west base, while low embankments extend north and south from the pyramid connecting it with the inclosing ridge. This grand group of structures is in an advanced state of ruin, the crumbling piles having been reduced to natural profiles by centuries of cultivation and herding, and no traces of the superstructures, which must once have crowned the pyramids, are now to be seen. Everywhere there are scenes of ancient occupation.

The sketch for the Panoramic View was made from the summit of the Pyramid of the Moon. This monument is made to appear in its proper relation to its associates, and occupies the immediate foreground, A. At the left, rising grandly above its cluster of terraces and attendant pyramids, is the Pyramid of the Sun, B. The pyramid-bordered court of the Battered Goddess, C, appears behind the Pyramid of the Moon, and leading out of this and extending far away toward the south is the Pathway of the Dead, and beyond the Pyramid of the Sun, on the sonthern bank of the Arroya of the Rio San Juan, is the noble group called the Citadel, E. The course of the Rio San Juan, which runs to the west—that is, to the right in the picture—is indicated by the letters F, F, and the Cathedral of the Village of San Juan appears at G. The object of the panoramic sketch is to give a map-like clearness and completeness to the view, while the photograph serves to record details of actual appearance. It should be observed, however, that the photographic views do not bring out the minor works to advantage, as they are obscured by culture features.

The city of Mitla, situated on the southern borders of Mexico, best illustrates the Toltec architecture. The ruins of this city have been described by various explorers and seem to present all the features which were peculiar to other Toltec cities, with some that were peculiar to the Maya cities in Guatemala and Honduras. Among the most notable feature in this city are the massive colums, which were used for the support of the roof, and in some cases to support the floor of the main apartment. In this respect they resemble the columns which were found at Quemada, and at the same time resemble the columns found at Chichen-Itza and Palenque, but differ from them in this respect: they are placed inside of the walls, instead of outside, as in the Maya cities.

Another feature of the architecture at Mitla is. that the walls are highly decorated with sculptural stones, which present various conventional ornaments resembling the Greek fret. The description of these ornaments and of the general construction of the city will be given at a future time, though attention is called to them here as furnishing one more specimen of the far famed Toltec culture.

PHILIPPINE STUDIES.

II. FOLKLORE.

BY ALEXANDER F. CHAMBERLAIN.

As with language, so with folk-lore, the great mass of phenomena in the Archipelago is fundamentally Malayan, as the investigations of Jagor, Meyer, Schadenberg, Semper, Blumentritt, and others, besides native writers, have shown. In this brief article a few points only can be touched upon, preliminary to a more extended study of folklore, religion and sociology. The advent of Christianity among so large a portion of the population of the Philippines, and of Mahommedanism in Sulu and parts of Mindanao, has, of course, extinguished much of the old folk-belief, but enough remains to show its primal source and basal characteristics.

A. RELIGIOUS AND SOCIAL.

1. ACUBAC. The name of a dance of which certain Negritos are very fond. Around a girl (or several girls), who stands in the middle, a number of men, holding fast to each other's belt, march in time to a monotonous song called *inalug*, which is sung by the women. This song is considered beneath the dignity of old men, and is only indulged in by the young. It closely resembles some of our own children's games.

2. ANITO. This is a widespread name in Philippine languages for the soul or spirit of a departed ancestor,—these spirits are also called *nono*. In heathen days (as even now with some of the Igorrotes) the *anito* was the center of religion, customs, and social life. Every village had its sacred tree, the favorite abode of the *anitos*. These ancestor-spirits were more real to the Philippine Malays than the numerous deities in which they seem also to have believed, and whom they worshipped more or less. Some of the tribes used to build little toy-houses for the *anitos* to dwell in, and various places, utensils, etc., were dedicated to their use. They were at once the *genii loci* and the *lares* of the people. See further under *Fig.* See also *Divata.*

3. ANTINANTIN. This was originally a sort of amulet for preserving against the devices of evil spirits. It has now come to be used in the sense of "ear-ring." Among the heathen Tagals of former days the *antinantin* was a kind of Fortunatus-rod, by which riches and happiness could be achieved.

4. ASITERA. The name given by the heathen Igorrotes to the old women priests, who conducted their religious ceremonies. They were supposed to be inspired by an *anito*, or ancestral spirit.

5. BAGANI. The name by which the priest of the god Tagbusau (god of war) is known among the Manobos of Mindanao. It was the duty of the Bagani, when the enemy had been overthrown, to begin the cannibalistic feast after dipping the talisman of the god (which it was his privilege to wear) into the blood of the slain.

6. BAYOC. The name of the high-priest, or "Pope" of the Zambales of Luzon in former times, whose business it was to conduct a sort of baptismal ceremony with the blood of pigs.

7. CATALONA, CATALONAN. These were the names of the priestesses and priests of the heathen Tagals.—the high-priest was called *Sonat.*

8. COMINTAN. The name of the national song and the national dance of the Tagals, both in one. There are several varieties of the *comintan* (a love-song and love-dance, a mimic-song and dance, and a general festive song-dance). The melody of the *comintan* is also sung at the funeral of children. It is the favorite popular melody of the Tagals.

9. DIVATA. A Visayan term corresponding to *anito* in some other Philippine languages. *Divata* is also the name of the harvest-god among the Manobos of Mindanao. In many parts of the Archipelago the *anitos* seem to be more or less deities of the harvest, or of agriculture.

10. GAVAY. Among the Mundos, a mountain-people of Cebú, who seem to be still heathen, the belief in sorcery, for which the native term is *gavay*, continues to exist. The bewitched person can, however, be "unbewitched," as the result of going through certain ceremonies.

11. MAMBUNUNG. The name of the male priests among the Igorrotes of Luzon. They are much less numerous than the female priests or *Asiteras*, and their influence is not so great. These priests are also "doctors," using the blood of the victim of sacrifice to smear the patient. The rites used by the *Mambunungs* are confided to the son by the father, when on his death-bed.

12. NONO. Ancestral spirit. See *Anito.*

13. TALINDAO. One of the national dances of the Tagals, taken part in by four persons, who stand opposite each other, hardly leave their place, and make few movements. A castagnet-accompaniment also occurs.

14. TIBAO. The name of a nine-days festival (still surviving among the Tagals) held upon the death of an adult. On the third day, the most important one of the ceremony, the soul of the dead person is believed to return to the house in order to take part in the proceedings. Every effort is made to obtain proof of his having done so. The festival is now pretty

well mixed up with rites of Catholic origin. The *tibao* is also known as *Siamnaarao*. It was not infrequently an orgie more or less.

B. PLANT AND ANIMAL LORE, ETC.

1. ARECA-PALM. The areca-palm (*Areca catechu*) which furnishes the famous betel-nut of the East Indies, is naturally of importance in the folklore of the Philippines. According to the Bagobos of southern Mindanao, the goddess Malibud, after her consort Todlai had taken a little boy out of a bamboo, split an areca-palm, out of which came a girl named Beigebei, the first of woman, who subsequently married the boy and became the mother of mankind.

2. BAMBOO. In the beginning, say the Bagobos of southern Mindanao, the god Todlai opened a bamboo (with the areca-palm the first plants on earth) and took out of it a little boy named Cambulan, the first of all human beings, and the father of all by his wife Beigebei, the first woman, born of the areca-palm.

3. BANYAN. The banyan or Indian-flg tree (*Ficus indica*), the name of which in several dialects is *balete*, is reverenced by some tribes of the Archipelago to a considerable extent. In Tagal the evil spirit, who dwells in the fig-tree is called *ticbalan*, a deity of importance in heathen times. The heathen natives never used to pass by or under one of these trees without saying, with a gesture of the hand, *tavitpo*, "by your leave."

4. BAT. Among the deities of the Vicols of southern Luzon is *Kalapitnan*, "Lord of Bats." This spirit is said to dwell in the wonderful stalactitic cave of Libmanan in the province of Camarínes Norte.

5. BUFFALO. The *timarau* (*Bubalus mindorensis*), or buffalo peculiar to the island of Mindoro, figures in the "traveler's tales" of some of the natives of other islands to whom Mindoro has long been a land of myth and story, in some respects, at least

6. CROCODILE. The crocodile (one of its most widespread names is *buaya*) seems to have been formerly worshipped, or at least reverenced, by some of the Philippine tribes, and it is an important figure in their folklore and mythology. The Bagobos of southern Mindanao believe that eclipses of the sun and the moon are caused by a huge crocodile seeking to swallow them. According to the Mundos, a mountain-people of the island of Cebú, their shamans can metamorphose themselves into crocodiles, etc.

7 DOG. Mandarangan, the evil-spirit of the Bagobos of southern Mindanao, is said to keep two large dogs, which he sets upon human beings to bite them. As soon as an earth-

quake shock is felt, the Bagobos begin to beat their dogs furiously, so that the snake in the interior of the earth, hearing the noise of their howling, may be frightened and cease moving the post, the motion of which causes the trembling of the earth. This is kept up as long as the earthquake lasts. The same people also beat their dogs during an eclipse to scare the crocodile.

8. Dove. According to the Bagobos of southern Mindanao, both Mandarangan, the god of evil, and Nito, the deity of good, have the same common messenger, the dove called *limukun* or *dimukun* (the species is *Phabotreron brevirostris*). When they hear a dove call on the right they consider it a favorable omen, a message from Nito; if they hear it on the left, it bodes ill (word from Mandarangan) and they will abandon their enterprise.

9. Eel. The Igorrotes of Cabugatan in Lepanto, island of Luzon, think the eels in their country the incarnations of their *anitos*, or ancestral spirits; wherefore they feed them and are careful never to kill one.

10. Fig. The *Buddleia virgata*, whose native name in Tagal and several other dialects is *talik nono*, is of considerable note in Philippine folklore and mythology. The term *talik nono* signifies literally "hive of *nonos*,"—the *nonos* or *anitos* are the ancestral spirits, who are supposed to inhabit this tree. As they passed this and certain other trees, the heathen Tagals used to say "by your leave," an expression commonly employed by them when passing by other abodes of these spirits, large trees, curiously-shaped mountains, and the like.

11. Kingfisher. The Apoyaos of Calanassan in northern Luzon, consider it a favorable omen if a kingfisher flies past without screeching; if he screeches, however, it is a bad sign, and they will desist from their undertaking. The same idea is found in some other regions of the Philippines.

12. Pig. With many of the Philippine tribes, as with Malayan peoples generally, the pig is a very important animal. With the Tagals at the time of the Conquest the flesh of the pig (even now their tit-bit *par excellence*) was used in sacrifice, while its blood was employed in religious ceremonies of various sorts. Among the Zambales of Luzon the *bayoc*, or high-priest is said to have administered a sort of baptism with pig's blood. According to some of the Igorrotes, when it thunders, "the god Cabuniang is asking for swine." The Bagobos of southern Mindanao say that a great pig lives in the interior of the earth; the lightning arises from the blows he receives when beaten, and the thunder is the result of his shaking himself. Among the Guinanes of Luzon the pig figures in the process of curing the sick. To the door of the hut in which the sick person lies they tie a young pig, and poke him until he squeaks loudly;

meanwhile a man, armed with a lance, shield, and knife, sits by the patient, with his face turned toward the door,—this breaks the power of the evil spirit to disturb the sick man.

13. RAIN. According to the Bagobos of southern Mindanao, the "head of the sea" is in the sky, and whenever the sea moves his head it rains.

14. RAINBOW. Some of the Negritos make offerings to the rainbow, and regard its appearance as a good omen.

15. RAVEN. The Bagobos of southern Mindanao will not speak their own names, for fear of being changed into ravens. The raven, they say, is the only creature that speaks its own name. This idea seems based upon the fact that *uag*, the name of the raven, is onomatopoetic. Among the deities of the heathen Tagals was *Malupa*, "the divine raven," a "guardian deity of the soul."

16. SLEEP. The Malays of the Philippines have more or less of a dread of a person asleep, sharing the belief, so common among primitive peoples, that in sleep and in dreams the soul leaves the body. Hence, probably, the great curse of the Tinguinanes of northwestern Luzon: "May you die in your sleep!"

17. SNAKE. Snake or serpent worship is found in various forms in diverse parts of the Archipelago. The natives of the island of Samal in the gulf of Davao, southern Mindanao, will never kill one of these reptiles, the bite of which they ascribe to a higher will, although they do apply an antidote of leaves to the wound. The Dumat Negritos address chants to "a huge serpent that reveals to them in dreams the places where game and honey are to be found." Among the Pampangos of Luzon there exist still *tavak*, or snake-charmers, who profess to cure the bites of serpents. With certain of the Igorrotes of Luzon it is an evil omen (necessitating a speedy retreat) to have a snake crawl over one's path. According to the Bagobos of southern Mindanao, earthquakes arise from the fact that, in the interior of the earth, a great snake is trying to move away the large post which holds it together.

18. SNEEZING. Among some of the Igorrotes of Luzon it is a bad omen for anyone to sneeze while the foundation pillars of a new house are being set up. Does anyone sneeze, the building must be abandoned, or some one of the participants will die before long.

19. THUNDER AND LIGHTNING. The Manobos of the island of Mindanao consider the thunder to be the voice of the lightning, a belief to be met with elsewhere. The lightning itself, the Manobos think, has the form of some fantastic animal, which, when it strikes a tree or other object, leaves one of its teeth there.

20. TIKTIK. Among the superstitions of the Tagals is one that a bird called *tiktik* points out in his song to the evil spirits Patianak and Usuang, the places where women in child-bed are, so that they may afflict them.

21. VOLCANOES. Volcanoes form such a frequent and such a noteworthy feature in the landscape of the islands that they have left their mark everywhere in folk-thought. Very often they are deemed the abode of powerful spirits,—*Buhayen*, the name of a volcano in Mindanao, signifies "place of life." The Tagacaolos, natives of the region about Malalag in southeastern Mindanao, offer sacrifices to a deity of good and evil, who dwells in Mt. Apo, where they obtain sulphur. Mandarangan, the deity of evil among the Bagobos, is said to reside in the volcano Apo. The Bagobos believe also that the volcano of Mt. Apo was the only land to be seen in the vast primæval ocean.

The items treated of in this study have been gathered from all accessible sources, including the authorities mentioned in the beginning. No attempt at exhaustiveness has been made, the idea of these essays being to give a few interesting and striking facts preliminary to a more serious, detailed study.

THE PALACE OF MINOS IN CRETE.

BY WILLIAM COPLEY WINSLOW, D. D.

Three mighty discoveries brilliantly color the achievements of archæology during the year 1900. Of these the most astonishing, and to the classical world the most entrancing, is the re-discovery of Cnossus in Crete by Arthur J. Evans, F. S. A., of the Committee of the Egypt Exploration Fund, with its clear intimations of the truthfulness of tradition respecting the high civilization of Cnossus at an early date, and its resurrection of clay tablets which prove the existence of inscribed documents in the Hellenic lands six or seven hundred years before the first known Greek monuments bore Greek lettering. Not as astonishing is the discovery, by Dr. Petrie at Abydos, relating to the earliest historical and late prehistoric kings of Egypt, simply because it was Petrie who delved in the mounds of Abydos. Still less astonishing is the glorious unearthing of thousands of tablets at Nippur by Dr. Hilprecht, because we all supposed that mound contained important relics.

Aided by the Cretan Exploration Fund, Mr. Evans, after long preliminaries of enforced delay, began a thorough excavation of the site of the prehistoric palace at Cnossus. As a general result there have been disclosed great courts and corridors, propylæa, a long array of magazines, numerous chambers, and especially the throne-hall and council chamber of Minos. The throne is carved out of alabaster, and its designs, once

brilliant in color, are relieved with a unique tracery and carved ornamentation which would seem to anticipate the Gothic style of our thirteenth century. There are fresco paintings superior, it is said, to any known examples in Mycenæan Greece; and groups, especially of women, clustered in the courts and on the balconies, full of life and expression. A life-size picture of a youth of Greek profile, is of exquisite classical finish. The sculptor takes no back seat at Cnossus, as witness a marble fountain patterned after the head of a lioness with enamelled eyes; an alabaster vase, designed from a Triton shell; a fragmentary frieze, with rosettes so beautifully cut as to be pronounced superior in its way to anything we possess from Mycenæ; a portion of a bull, with its head entire, in relief, executed in a hard plaster like that of the great Italian masters of the sixteenth century. A scholar, in speaking of the wealth of relics of early Ægean civilization, declares that "exploratory digging to the south and west of the palace revealed a veritable Pompeii of houses of the same early period, which yield by far the finest series yet found of vases of the singular primitive Cretan polychrome style, unrepresented in European museums."

But let us glance at the evidence of intercourse between Crete and Egypt. Each, for example, had its famous labyrinth. In the palace at Cnossus, with its maze of corridors and small chambers, its winding passages and its store-rooms with blind endings, we see the mate to the labyrinth of the Fayum. For Daedalus, who built the Cretan labyrinth, according to Diodorus, was instructed by masters in Egypt, and himself built the propylæum of Ptah at Memphis and received divine honors in a neighboring shrine. In the great Eastern Court was found an Egyptian seated figure of diorite of the Twelfth Dynasty, and somehow the entire edifice, according to Mr. Evans, bears striking affinities to Egyptian models of architecture. This appears even in details. Thus, the chequer arrangement of dark and light squares on the façade of a Minoan shrine depicted on a piece of fresco, recalls the decoration over the door of a house from a Sixth Dynasty tomb. A structural paralellism, moreover, is exhibited in the insertion between the capital of the columns and the beam above of a small rectangular cushion, though the columns themselves conform to the Mycenæan canon by gradually decreasing in diameter toward their base. A beautiful adaptation of an Egyptian architectonic motive is seen in a tall stone lamp of porphyry-like material, the pedestal of which is shaped like a lotus column. Its section, however, is quatrefoil and the carving round the upper section of the receptacle shows a foliation of free Mycenæan character.

Decoration and technique show Egyptian affinities. Mr. Evans is so much of a Cretan in his claims—going so far even as to think the Cretan Labyrinth gave the name to the one at Lake Moeris—that his dictum is all the more forcible, when he

emphasizes these affinities in detail. A special feature of the decorative art of Cnossus seems to have been the inlaying of caskets with finely cut plaques of rock crystal. Some of these, show traces of painting on their lower surface—in one case, the fore part of a galloping bull in the most exquisite miniature style. With this may be compared a rock crystal scarab, painted inside, found by Prof. Petrie at Gurob. As in Egypt, the rubble walls are faced with plaster on which frescoes were painted in bright colors. Both in the conventional designs and in the figures Egyptian influence can be traced. Among the artistic conventions of Egyptian origin may be noticed the practice of surrounding the contours and branches of trees with a separate outline, within which the leaves and twigs are enclosed. It is also observable that the Cretan artist made the same preliminary use as the Egyptian of vertical horizontal lines, dividing the field to be decorated into small squares for the guidance of his brush.

A remarkable example of Egyptian chiaroscuro appears in the mural painting of the young princess at Tell-el-Amarna. Its analogy is evident in the frescoes of guardian griffins in the throne-room at Cnossus, where the lower parts of the bodies are shaded with hatched lines. Mr. Evans further notes that the landscape pieces with flowering reeds and running water and fish below, recall, in their choice of motives, Egyptian paintings like the pavement of Tell-el-Amarna. One of these, on a clay sarcophagus—itself a copy of the painted wooden chests of contemporary Egypt — shows water-fowl among papyrus-like plants, one of which, as often in Egyptian paintings, is seen pursuing a butterfly. Yet more interesting are the comparisons suggested by the paintings of life-sized human figures in the corridor of the palace at Cnossus. Here we see long processional scenes of strikingly Egyptian character. The succession of youths bearing vases set with precious metals, irresistably recalls the procession of Keft chieftains on the walls of the Rekhmara tomb. The Egyptian conventions of flesh-coloring are maintained—ruddy-brown for the men, white for the women. The general attitude of the figures is the same; the heels and toes of both feet are represented flat on the ground; but the modelling of the limbs is fuller and more advanced, the eye is partly in profile, the outline of the face is almost classically Greek. But we have already referred to the almost purely Greek face of a life-size picture of a youth, and of the advanced civilization of Crete in the arts which later on glorified Hellas forever. Cretan genius borrowed from Egypt, but beautified and added to it all.

I referred to the discovery of two scripts at Cnossus; but it is too early to arrive at positive conclusions respecting their age, origin, and their relation to the Phœnician and Egyptian alphabets. The two scripts upon the many hundred clay tablets unearthed, called by Mr. Evans the hieroglyphic and linear, appear to me, in the case of the pictographs, to be

largely evolved from the Egyptian system of pictorial writing, but also on independent lines, so that the *developement* is purely the work of an Ægean people on Cretan soil. I will illustrate this resemblance in two cases: a number of parallels are clearly established, as for instance, those of the Egyptian hieroglyph for palace, and those of the royal wasp or bee, And even in the linear tablets there sometimes appear representations of vases, ingots, and ox-heads, precisely the same (reproduced?) as the vases, ingots, and ox-heads brought as tribute to the governor of Thebes, under Thothmes III., and which are painted upon the governor's tomb. In the case of the linear script, which is an upright text and very European in aspect, I have little doubt of its origin in part from the Phœnician text, although this Cretan text existed, as Mr. Evans says, at least 600 years before the Phœnician alphabet was introduced into Greece. But this is consistent, because he also said (in a letter to the London *Times*) of the "finds" at the palace, that "there are none which point to a period as late as the latest prehistoric elements of Mycenæ itself." In other words, in a pre-Mycenæan age there was a Greek civilization in Crete of the highest type in some respects, and Mr. Evans' discovery is, all in all, the most astonishing for many a day in the whole field of archæology.

The excavation is but half completed; covering, I believe, two acres of space. Let us believe that the money to excavate the other two acres will be promptly contributed.

THE TOMB OF BUDDHA.

Prof. Rhys Davids has located the tomb of Buddha in the Himalayas. He found a pillar bearing an inscription written by Asoka about 253 B. C., recording the fact that the pillar marks the site of the garden where Buddha was born. It is in a region which is filled with relics and memorials of Buddha. The region is covered with small mounds which are Buddhist burial places. One of these mounds, which rises to a height of 21 feet above the plain, is 116 feet in diameter and has been excavated by Mr. W. Pepe and Prof. Davids. A number of interesting objects were discovered, including a steatite vase filled with small ornaments and beads. The tomb proper is a composition of solid brickwork. Down the center there is a curious pipe-like drain, the purpose of which is obscure. At a depth of eighteen feet below the surface was found a large stone slab, which covered a stone chest in which were found three urns, a box of steatite and a crystal bowl. These objects were beautifully finished and presented all the appearance of glass. The urns contained ornaments in gold, gold beads, etc. Some of the gold leaf fragments bore figures of elephants.

NOTES ON ASSYRIOLOGY.

BY REV. J. N. FRADENBURGH.

THE successful Assyrian archæologist must needs have exceptional qualifications. The demands upon his knowledge, skill, patience, and energy are most exacting. Only the best equipped and best disciplined can successfully grapple with the problems that are presented for solution. His physical labors are frequently such as to test the strongest constitution. He should possess a large endowment of diplomatic tact, and be able to command the confidence and respect, if not the fear, of his native workmen. He should have some knowledge of colloquial Arabic, and be familiar with classical and oriental history. He should know the different styles of architecture, sculpture, and decoration in their several periods, and the various forms of pottery. Acquaintance with the language of the monuments and the various styles of writing is required for the best work. Different methods employed for the disposition of the bodies of the dead; a good knowledge of mathematics needed to survey sites, take levels, and deal with probabilities, chances, and averages; knowledge of numismatics, chemistry, botany, geology, and other sciences—these are important. The explorer must tell from the surface of the ground what probably lies beneath; from a small portion of a wall, what it once enclosed; from the material, form, and size of a brick or tablet, the age to which it belongs; from the modeling of the fragment of a statue, its age and locality, and from a single piece of sculpture, the period to which it may be assigned. He must be familiar with the forms of gods and goddesses, and demons and composite figures, so as to recognize them at a glance. He cannot hope to succeed without becoming a thorough student of classic and oriental mythologies. He must possess a fruitful and yet well-disciplined imagination, and an intuition which will leap to correct conclusions before the slower and longer road of reason has been traversed. His labor is no vacation work, and few there be that are qualified for so exacting a service. But we are educating such a school of explorers.

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THE work of the third Babylonian Expedition of the University of Pennsylvania at the ruins of Nippur has realized the most sanguine expectations of its promoters. The extent of the pre-Sargonic settlement; the character of the Temple of Bel preceding the reign of Ur-Gur, king of Ur about 2700 B. C.; the boundaries of the territory enclosed in the walls of the old city; the location of one or more of the great gates; the age, character, and extent of the public buildings discovered during

the first campaign; the modes of burial during different periods, and the position and character of the temple library—these were the objects set before the expedition, as stated by Professor Hilprecht in *The Independent*, November 15, 1900. All these problems have been solved, while many other discoveries have been made "having an important bearing upon the topography and history of ancient Nippur, and upon the religions ideas and the customs of the daily life of the Babylonian people." Professor Hilprecht says, in the article to which we have referred: 'We knew that the Nippur of the fifth and fourth millenniums had practically the same extent as the Nippur of the days of Artaxerxes and Darius. We have proved the correctness of my theory concerning the temple library, by finding it at the spot where for twelve years I knew it would be unearthed. Nearly 1,900 documents have been taken from its rooms and shelves. We have found convincing evidence that the stage-tower I have referred to as introduced by Ur-Gur existed in Babylonia long before the old Sumerian race was conquered by the invading Semites. I have determined that the large building bearing the colonnade was not a creation of the Cassite Kings who ruled Babylonia from about 1700 to 1100 B. C., as was stated on the authority of the second expedition. It was constructed about one thousand years later, near 300 B. C."

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ANCIENT BABYLONIA contrasts favorably with many other nations in the social and legal status of the women. She could enter into partnership on an equal footing; have the complete control of her own property; could buy and sell, lend and borrow, give and bequeath according to her own will. She manufactured and traded on her own account. Sometimes a father would transfer all his property to a daughter, in return for which she would support him during his lifetime. There is the record of the gift of a slave by a husband to his wife, the document stipulating that the slave and her children should remain the property of the wife in case of divorce or the death of her husband. Whether single or married, she was the equal of her husband in the eyes of the law.

There were priestesses as well as priests, and the early goddesses seem to have been the equals of the gods. There were women who lived like nuns devoted to their god, and yet these nuns could possess property in their own right. The rights of women were maintained wherever Babylonian law and culture extended. The dowry that a woman brought with her upon her marriage was her absolute property. The wife could use her dowry in business independent of her husband, or she could use it in furnishing her house, or to start a business in partnership with her husband. The husband could have no greater interest in her dowry than a usufruct.

"If the husband died and the widow married again, she carried her former dowry with her. In such a case the children

of the first marriage inherited two-thirds of it upon her death, the remaining third going to the children of the second marriage." This law, however, could be overruled by an attested will.

There is a great mass of material bearing on this subject, much of which awaits translation.

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CONSTANT additions are being made to our knowledge of the history of "Ur of the Chaldees," the city of Abraham. Assyrian scholars in America may now study the subject from original sources without going abroad. A collection of tablets and cylinders—derived chiefly from Telloh, Warka, Nippur, and Borsippa—has been purchashed by Dean E. A. Hoffman and presented to the General Theological Seminay of New York City. They relate to various subjects and are of different dates, some extending back to three thousand years before the birth of Abraham. These documents, supplemented by all others published to April 1, 1900, have been translated for the first time and published by the Oxford University Press. The chronology of the kings of Babylon who ruled seven thousand years ago has been fixed. The tablets prove that, at that early period, there was a high degree of civilization in this remote antiquity. Of especial value is the arrangement of all inscriptions under the king to whose reign they belong. The author says: "Recent excavations have brought to light tablets which show us that, in the land between the Tigris and the Euphrates, there existed a highly civilized nation as early as 5000 B. C., a nation which had its own language and its own system of signs in which to express it."

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PROFESSOR SAYCE contributes to the Proceedings of the Society of Biblical Archæology a paper on the language of the Mitanni, once spoken in Mitanni, the Aram-Naharaim of the Old Testament. This kingdom belonged to northern Mesopotamia. Dusratta, its king, wrote to the Egyptian Pharaohs, and one of his letters is in his native tongue. Professors Jensen, Sayce, and Brünnow have been engaged in its decipherment, and have made such progress that Professor Sayce has published a grammar. The language is highly agglutinative, and has a number of important resemblances to the Vannic.

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SCHRADER'S "Keilinschriftliche Bibliothek" is devoted to the transliteration and translation of Assyrian and Babylonian texts, and is of great value. The first half of the sixth volume contains "Assyrian and Babylonian Myths and Epics," and is edited by Dr. Jensen. Here, is a version of the Gilamesh Epic, and in an Appendix are fragments of second and third versions of the Flood Story. Here are also conjuration formulæ, a hymn toGilamesh, and several other fragments.

THE manuscript of the account of the condition of the Tower of Babel, as written by the Greek traveler Harpocration, has been recently discovered; and M. De Mily gave an interesting account of its contents at a session of the Paris Academy of Inscriptions. The following summary is from *The Independent:* "The tower was renovated in the days of Nebuchadnezzar, in the sixth century B. C., and this king reports in the inscription he caused to be made, that the town had been erected forty-two generations before his time. Thanks to the report of Harpocration we now know that as late as the fourth Christian century this temple was still a place of worship, although it ceased to be such, some time before 380. The tower was 94 kilometers from Ctesiphon, south of Babylon. It consisted of a very wide substructure, 75 feet high, the sides being 184 metres. In the middle stood a four-cornered tower, built of six sections, one upon the other, each 28 feet high, and upon the top section was a small tower, only fifteen feet high. These seven stories together made the structure 67 metres high. The ascent to this temple was by 365 steps, of which 300 were of silver and 65 of gold, the number to equal the days of the year. The division into seven sections corresponded to the days of the week. These details confirm to the letter the conclusions which Oppert had reached through his measurements on the ground."

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LUZAC'S Semitic Text and Translation Series has reached its seventh volume, and is of great value to the student of Assyriology. The last two volumes bear the title, "The Reports of the Magicians and Astrologers of Nineveh and Babylon in the British Museum," and are edited by Mr. R. Campbell Thompson. These tablets from the Nineveh library, from their form called "pillow-tablets," contain astrological reports to the reigning king and belong to the eighth and ninth centuries before Christ. They are authoritative, being mostly signed documents, thus preserving the names of the old astrologers. Omens from heavenly bodies, natural phenomena, and actions of animals make up the bulk of the volumes. Observations of the moon, of which there is a large number, may have been made to serve as data for calculating the length of the month.

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PROFESSOR ZIMMERN has proved that the name of the ancient hero Atarpi should be read Atrahasis, and that he is identical with the Chaldean Noah of the Deluge story. Berossus alludes to the belief in a second creation after the destruction of the human race. The Atrahasis tablet of the Kouyunjuk collection shows that the same belief prevailed in Assyria.

ANTHROPOLOGICAL NOTES.

BY ALEXANDER F. CHAMBERLAIN

JAVANESE PUPPET-PLAY. In the Internationales Archiv für Ethnographie (Vol. XIII., pp. 97-119) Dr. H. H. Juynboll continues his account of the Wajang Kĕlitik or Kĕrutjil. A detailed description of the puppets, stage, accessories of various sorts, names of the puppets, their places, etc., are given. A brief bibliography of the subject concludes the article. The author seems to agree with Professor Poensen in the opinion that the Wajang kĕrutjil is a more modern, changed form of the puppet-play as compared with the more primitive and earlier Wajang purwa. The one is more classic than the other, both in the narratives and in its images. The art-work of the latter is also inferior.

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FIRE-WALKING IN INDIA. In the Journal of the Society for Psychical Research (Vol. II., pp. 312-321) for November, 1900, Prof. H. K. Beauchamp, of Madras, gives somewhat detailed accounts of "Fire-Walking Ceremonies in India," upon which subject Andrew Lang had previously touched (pp. 2-15). Mr. Beauchamp notes the curious fact that in India fire-walking "is countenanced and thought much of, even amongst the higher castes of Hindus, whose attitude towards rites of an extravagant and public nature, such as the hook-swinging and devil-dancing ceremonies of the South, is usually marked by a certain haughty tolerance and studied aloofness." Indeed in Benares, the fire-walking ceremony was "under the direct patronage of Maharajah Bahadur Sir Jotandro Mohan Tagore, K. C. S. I., a Brahmin of the Brahmins, who traces his descent back for over one thousand years to one of the five famous Brahmin prophets of Kanauj." It was in his palace that the fire-walking, or *Agni Yajna*, took place. The ceremony proper was preceded by "an elaborate ritual of incantation and solemn pantomime, including sword brandishing, idol parading, circuit processioning, incense scattering, cocoanut smashing, plume waving; all intended to subdue and render temporarily harmless the demon of the fire."

Another fire-walking ceremony described by Mr. Beauchamp took place in connection with a small Hindu temple, dedicated to the goddess Draupati, at St. Thomas' Mount, near Madras. In this case, hardened soles would scarcely have been relied upon to protect the participants from injury, unless the onlookers were deceived by their eyesight. There is also given an account by a missionary of a "fire-walk," in the village of Sélei, near Madras, and another, by a Brahmin eye-witness, of

one at Peralur, in honor of Thanthoni Amman, the tutelary goddess of the village. The article also refers to the vivid account of the "fire-walk" in Mr. Percival Lowell's "Occult Japan."

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DINKAS OF THE NILE. The "Dinkas of the Nile" are the subject of a paper by Dr. Henry Girard in L'Anthropologie (Vol. XI., 1900, pp. 409-429). The essay is ethnographical and anthropometrical. The Dinkas occupy an extensive region in the Bahr-el-Ghazal district of the Upper Nile, numbering perhaps a million souls. The Dinkas possess a statue rather higher than that of several other negro peoples, their skull is decidedly dolichocephalic, and the head relatively small (in proportion to height of body). Polygamy, fetishism, snake-worship, and a belief in metempsychosis prevail among them. The failure of Islamism to penetrate to them, the author, with Dr. Frobenius, attributes to the custom these conquering Semites had of not converting the tribes doomed to the slave-trade. To the Dinka, the white man is all-powerful, and he is asked to send rain, cure disease, bring about the birth of a boy, etc. The Dinkas possess the average intelligence of the Eastern Soudanese.

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EGYPTIAN CULTURE ON THE IVORY COAST. In L'Anthropologie (Vol. XI., 1900, pp. 431-451) M. Maurice Delafosse publishes the first part of an interesting paper "On Probable Traces of Egyptian Civilization and of White Men on the Ivory Coast." In his suggestive volume "Tombouctou la Mystérieuse" (Paris, 1897) M. Felix Dubois exploited the view that the Songhaï culture, discovered at Dienné and at Timbuctoo, is of Egyptian origin. This the author takes as proof of the penetration of ancient Egyptian culture into the Nigerian region and to the southwest, even as far as the Gulf of Guinea. The present essay deals with probable traces of such culture on the Ivory Coast, or the region between the river Bandama and its affluent, the Niz, south of the eighth degree north latitude. This region and its inhabitants are both called Baoulé, and the people are a comparatively recent mixed race of Ashanti stock, therefore negroes. There is no attempt, of course, to show a racial connection,—the ancient Egyptians were not negroes. The evidence adduced by M. Delafosse is derived from a study of the arts and industries, customs, rites, religion, etc., of the Baoulé, and from archæological investigations. According to M. Delafosse, the method of construction of houses, the clothing of the men and women, types of vases and other pottery articles, the art of gold-working (gilding wooden statues, among other things), wooden statues (their carxing, ornamentation, etc.), the tendency to caricature, etc., found among the Baoulé recall decidedly the ancient Egyptians. But more proof is needed here.

EARLY TRADE-ROUTES OVER THE ALPS. Before the Württemberg Anthropological Society at Stuttgart, Feb. 10, 1900, Dr. Hedinger read an interesting paper on "Trade-routes over the Alps in prehistoric and early historic Times," an abstract of which appears in the Correspbl. der deutschen Ges. f. Anthropologie (Vol. XXXI., pp. 61-62). Not only ancient writers, but many archæological finds bear witness to imports over the Alps into northern Europe, from the south. There is evidence in the beginning of the first millennium B. C., of an active commerce between Greece and Italy and the Semitic-Hamite peoples of northern Africa and Asia Minor (Hittites, Phœnicians, Egyptians, etc.). The mountain-passes and the river-routes of the Danube and the Rhone served early to spread this commerce over a large extent of country. In the oldest Bronze Age, many centuries B. C., several of the Alpine passes were used in this traffic. Among the oldest of these may be mentioned: the Birnbaumwald pass, which served especially the Illyrian trade,—it is near the Laibach moor; the Saifnitz pass, in the same region; the Pleken pass, which rich finds and inscriptions prove to have been early used by Illyrians and Celts; Reschen-Scheideck with Brenner; Maloja with Julberg; small and great St. Bernard; Mont Génèvre. That the Brenner pass was used in prehistoric times appears from the numerous finds at Matrei, Nonsberg, etc. It lost considerable of its importance through inroads of the Celts, but when the Romans paid attention to these Alpine passes in connection with the "Celtic terror," its importance increased again. The Gotthard pass is of much later utilization in historical times, the Vierwaldstättersee, which prevented northerly approach, hindering its development as a trade-route. Its use practically begins with the foundation of the Hospital in 1331 A. D. About the Simplon, Splügen, and Septimer passes little is known historically. Towards the end of the second century A. D., the Simplon pass seems to have served the trade between the Italian lakes and the upper Valais, but finds of the Hellstatt period in that region indicate a much earlier use of the pass. The Julberg pass was on a Roman road, but this is not certain of the Splügen and Septimer passes. So much for the eastern passes. The most important western passes are those over the great and the little St. Bernard, routes connecting the south with western Switzerland, the Rhine, eastern and northern France, in the most convenient way. After the conquest of the Salassi, Augustus had built a fine military road over the little St. Bernard, remains of some of the houses along which are said by some to be still extant. From Massilia (founded by the Phocœans) a trade-route led over Mont Génèvre to Turin, whence several others north and northwest.

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IRON AGE IN THE JURA REGION. In L'Anthropologie (Vol. XI., 1900, pp. 369-400), M. Maurice Piroutet discusses "The First Iron Age in the Departments of Jura and Doubs," the

Jura region of eastern France. In this region there exist a very large number of tumuli or funeral mounds, many of which have been by some writers attributed to the battles of the barbarians during the fourth and fifth centuries, the Saracens in the seventh and eighth, etc. But, according to M. Piroutet these remains belong to peoples of the first age of iron in this part of the world. In general, there appear to be two types of these tumuli, that of Alaise and that of Moidons, distinguished chiefly by the articles found in them. The age to which most of these tumuli belong (a few may be Neolithic, and some of the Bronze Age) is the period of the Hallstatt, and the beginning of the Marnian period. The regular occurrence in so many of these tumuli of the remains of women and children, indicates, according to M. Piroutet, that the inhumations were neither transitory nor merely military. The people of the Moidons type appear to have settled in the country towards the close of the Bronze Age, and a little later came tribes more warlike (this is shown by the presence more often of weapons and horses in the tumuli), the people to whom the type of Alaise is due. Later still came the Galates, with the beginnings of the Marnian culture.

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BRONZE AGE IN NORTH GERMANY AND SCANDINAVIA. As a reprint from the Archiv f. Anthropologie (Vol. XXV. and Vol. XXVI.) appears Dr. O. Montelius' extended and profusely illustrated study of the "Chronology of the Oldest Bronze Age in North Germany and Scandinavia." Some of the archæological dates arrived at by the author after long and careful study are, as follows: Copper Age began in Egypt before 5000 B. C.; Cyprus, beginning of fourth millennium B. C.; northwestern Asia Minor (Hissarlik, etc.), before the end of the third millennium B. C.; Greece (pre-Mycenæan), in third millennium B. C.; Hungary (finds of Lengyel), about middle of third millennium B. C.; Upper Austria (finds of Mondsee), Sicily, rather later, about the second half of the third millennium B. C.; Italy—the Bronze Age proper begins with the second millennium B. C., but finds dating from the third millennium are known in the central and northern portion of the peninsula; Spain, France, Switzerland, England, Scotland, South Germany, and Bohemia, about the same period; North Germany and Scandinavia, real Bronze Age first centuries of second millennium, Copper Age second half of previous millennium. According to Dr. Montelius the development of the period in question in Scandinavia and North Germany may be stated as follows:

A. LATER STONE AGE: *First Period* (no stone graves; no metal); *Second Period* (dolmens and graves without stone-walls; no metal); *Third Period* (passage-graves and graves without stone-walls; the first appearance of copper, 2500 B. C.); *Fourth Period* (stone cists and graves without stone-walls; copper).

B. BRONZE AGE: *First Period* (principally tin—poor bronze, 2000 B. C.; no swords, no spear-points with socket); *Second Period* (bronze rich in tin; short swords; at the close of the period, longer swords and spear-points with sockets).

Montelius believes that the discovery of copper took place somewhere in southwestern Asia (Babylonia?), whence tin-bronze came to Europe.

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EFFECT OF LIGHT ON THE HUMAN BODY. The effect of light on the human body with respect to clothing is the subject of an interesting paper by Jos. Ritter von Schmaedel in the Correspbl. der deutschen Ges. f. Anthropologie (Vol. XXXI., pp. 50-53). The increased activity of animals brought up in the light was long ago noted by Moleschott, and the popular aversion to having a house face the north is well-known to be of old time. According to the author, if there are not to be evil effects upon the living organism from the chemical phenomena resulting from the light-waves, there must exist and be maintained a certain equilibrium between them and the reactions caused by them. Against too violent influences of the light-waves nature has herself provided the remedy: "Those races of man inhabiting regions where the intensity of light is of a particularly high degree are provided with pigments of the skin, which, by reason of their coloring, act as extraordinarily effective protections against a too violent effect of the chemically active light-waves." The black-brown skin-pigment of the Negro, the brownish skin-pigment of the Arab, the yellowish and reddish skin-pigments of other races, in their way, chemically neutralize certain evil effects of the light-waves. These facts are of considerable importance to people of the white race dwelling in tropical lands, since a protective system of clothing might, with great advantage, be adopted by them. Light white or blue clothing has the advantage of reflecting the warm-rays, but is not chemically effective against the waves of light. Dark stuffs (not blue of the spectrum), on the other hand, have the advantage of warding off the chemically effective light waves and letting the warm-rays through.

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THE BIRCH AS A SYMBOL OF THE THUNDER-GOD. In the Internationales Archiv f. Ethnographie (Vol. XIII., pp. 81-97, 127-162) Friedrich Kunze publishes an interesting essay on "The Birchbroom as a Symbol of the [old German] God Donar." Among the points treated of are: The birch as a tree sacred to the thunder-god, the birch-twig in the service of Donar, the birch-rod as a defence against evil spirits, against local demons, etc. The author shows to what an extent the birch-broom appears as a remedy or a talisman against the evil spirits of the house and home, of the field, of the human body and soul. He also discusses the birch as a spring-tree, a May-

tree, an Easter-tree, St. John's Day tree, etc. Next to the oak the birch is the most remarkable tree in German folk-thought and folk-belief, and its relation to agriculture and the harvest are very close, likewise its protective rôle in "wind and weather." It is worth noting that the Finns call March *malisku*, "birch-sap month," while the eastern Slavs also named this month after the same tree *brezen*, a name which the Lithuanians, further north, attach to April. Donar's bird, the cuckoo, also stands in relation with the birch. The virtue of the birch-broom, Dr. Kunze thinks is due to the fact that it consisted of a bundle of rods from the tree sacred to the great thunder-god.

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Taboo. In L'Anthropologie (Vol. XI., 1900, pp. 401-407), M. Salomon Reinach publishes "Quelques Observations sur le Tabou." According to the author, the notion of *taboo* is narrower than that of prohibition (interdiction), and the *taboo* may be said also to be a non-motivated prohibition,—the *taboo* does not involve the intervention of a third party (it is the imprudence of violation alone that brings on the death, disease, or whatever the penalty may be), and the danger it marks is not apparent. *Taboo* represents the spirit of authority; the rituals of purification, substitution, of sacrifice even, were inspired, originally by the principle of liberty and of freedom. So thinks M. Reinach, and takes issue with the wide-spread idea that the cunning and roguery of priests and religious legislators cost mankind its liberty. By limiting prohibitions the church has set man free.

EGYPTOLOGICAL NOTES.

BY WILLIAM COPLEY WINSLOW, LL. D.

Abydos, thanks to the skill of Dr. Petrie, comes to the front for the archæological year 1900. In the March-April "Notes" I dwelt upon his prehistoric work at Hu, the site of Diospolis. I turn to his delving at Abydos by quoting his words at the recent annual meeting of the Egypt Exploration Fund, from an advanced type-written copy sent to me: "How great and hopeless a mystery clung to the beginning of old Egypt! How many controversies had waged over Manetho! And now from the royal tombs of Abydos we have seen and handled the drinking bowls and furniture of the kings of the First Dynasty, even the property of Menes himself." In a word, five out of eight kings named by Manetho have been identified, and also two others, of the nomes of Zeser and Narmer, assigned by Petrie to an earlier period. It will be recalled that Menes, the first king of *united* Egypt, was the sucessor of petty kings and god-kings. In the remarkable exhibition in London of the relics from Abydos, is a part of a slate bowl

of Zeser, which Mr. Rawusley suggests his royal lips touched, and a piece of an alabaster jar inscribed Narmer. The last name is simply Nr and mr, as both vowels are supplied. When Mr. Rawusley saw the fragment of a crystal vase with Mena incised upon it he seemed to feel myth fade away, and the real king, who drank from a crystal goblet to the success of the city of Memphis, the city he had built in the fair fields, to stand before him.* I find no conclusive evidence as yet that the "yellowish pottery" is Grecian and, accordingly, is "proof that the Grecian merchants sailed the seas in 4,500 B. C." I do not know that Petrie makes the claim. If Rawusley is right, then even Evans in his pre-Homeric discoveries at Crete must yield to Petrie the palm of finding the earliest traces of Hellenic civilization known to us.

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A PALÆOLITHIC AGE. Sir John Evans at the meeting of the Fund, in his address as President, touched upon this point, when he remarked that among the objects just brought by the Fund to England were some flint implements of palæolithic forms such as have not infrequently been found on high land adjoining the valley of the Nile, but as to the age of which some question has arisen. He had already mentioned a discovery made by the late General Pitt-Rivers. During a stay at Luxor he devoted special attention to the sands and gravels at the mouth of the Babel Molook, in which the Tombs of the Kings are situated, and in beds about half a mile to the north-east of the Palace and Temple of Rameses II., at El Koomeh, in which numerous tombs had been excavated he found unquestionable chert flakes and cores and one rough root embedded in the matrix, which, of course, must have been deposited long previously to the hardening of the gravel—the erosion of the Wadi and the cutting of the Tombs—some of the flakes were actually chiselled out of the sides of the Tombs.

Sir John also said that the discovery in Somali-land a few years ago by Mr. Seton-Karr of numerous flint implements and chert implements of distinctly palæolithic types strengthened the probability of those of analogous forms found in Egypt being of the Palæolithic Age, inasmuch as in Somali-land there seemed to be no association of neolithic forms with those of apparently far earlier date. Recent discoveries made by M. Louis Gentil at Lac Karar about sixty miles southwest of Oran in Algeria, increase this probability to the verge of certainty, inasmuch as at that place implements of the same palæolithic character have been found associated with the remains of a North African pleistocene fauna incleding an elephant which is not the African elephant.

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PAPYRI FOR THE UNITED STATES. A selection of 118 papyri for a number of our universities is a valuable recognition of

*See the Atlantic Monthly for October.

our American scholarship and our financial part in promoting the work of the Fund. The papyri, mostly from the Fayum, include classical, municipal, business, religious, and even New Testament manuscripts; but the particular papyri designated designated for Yale, Columbia, Harvard, and so on will have to be announced later on. The collection of antiquities just sent to Yale and the University of Pennsylvania are particularly interesting.

GAMES OF THE MAKAH INDIANS OF NEAH BAY.

BY GEORGE A. DORSEY.

While on a collecting trip in behalf of the Department of Anthropology of the Field Columbian Museum during the summer of 1900, it was my good fortune to pay a visit to the Makah Indians of Neah Bay. While on the way to Neah Bay, by steamer from Seattle, I met by chance a Makah Indian, Charlie Williams, bound homeward. From Williams, who is an unusually bright and intelligent Indian, I endeavored to secure such information as he possessed regarding games of the Makahs.

While the more common games of the Makahs are well known, and while good descriptions of them, with their method of playing exist, yet the information which I derived from Williams was in certain ways so complete and the list of games so exhaustive that it seemed to me a description of the games would not be without interest. Furthermore, owing to the very peculiar position of the Makahs, dwelling on the seashore and spending so much of their time on the water, many of the games which have been derived from inland sources have, as played by them, undergone peculiar and very interesting modifications. Of the games of which I learned from Williams, sixteen specimen sets were collected from the village itself, representing seven distinct games.

DUTAXCHAIAS.—This game is played by young men, generally in the spring, or it may be played at any time of the year. The ring (*dutapl*) is of cedar bark tightly and carefully braided. Two specimens were collected, one of which has seen considerable usage. In playing the game, two converging lines of from six to ten men on each side are formed. The man at the apex of the converging lines takes the ring in his hand and rolls it forward between the lines as far as he can; as the ring begins to lose its momentum, and wabbles preparatory to falling, all shoot at it with an arrow (*tsik'hati*) from an ordinary bow (*bistati*). When the ring is struck by an arrow of one side or the other (*quilah*=winner), the losing side pay over an arrow as forfeit. The game ends at any time by mutual consent, or when one side or the other has won all the arrows of the opposing side.

TLITSAKTSAUDL.—This game ("shoot arrow") is also played by young men and generally in the spring of the year. Two goals are made, situated from twenty-five to thirty yards apart. As, from the nature of these goals, no specimens could be collected, a description must suffice. Five pieces of kelp are thrust into the earth in a row, the center piece being about one and one-half feet high, the outer pieces about three inches high, and the two intermediate pieces midway between the center and outer pieces. Over these is placed another piece of kelp, which is bent in a semi-circular shape, with its extremities thrust into the earth about two feet apart. From two to six play, all standing in front of one goal and shooting at the goal opposite, the object being to hit any one of the upright pieces of kelp. If the representative of one side or the other shoots and strikes the goal he shoots again. Should he miss, one of the opponents takes the arrow with which he shoots. Should he make a hit he retains the arrow. The object of this, like the preceding game, is to win arrows (*quilah*).

TATAUAS.—In this game a goal is also made of kelp, but instead of arrows short spears of red huckleberry, from three to four inches in length, are used. The game is played by two boys, each one sitting down on the beach facing his opponent, but at one side of him. B takes a piece of kelp stalk (*wal'k-a-at*) and thrusts it into the ground on his left side, at which A then hurls his spear. Failing to strike the goal, B takes A's spear, passes his piece of kelp to A, who then thrusts it into the ground by his left side, when B hurls the spear. In case he is successful he retains the spear, otherwise the kelp is returned to B and thrown at by A, and the game goes on as before. The object of the game is to win all the spears of the opponent.

KATIKAS (Sharp stick slanting).—This game is somewhat similar to the one just described, and is played by boys. On the side of a hill ten or more sharpened sticks are thrust into the ground at intervals of from two to three inches. Each player has his individual set of sticks or goal. One of the players rolls down the slope a large piece of kelp, six inches in length. If it so rolls as to impale itself on one of the sticks of one of the other players, he withdraws the stick from the earth and throws the kelp up in the air and attemps to catch it on the point of the stick. If successful, he retains the stick, which constitutes the game.

KEYUQUAH.—This is the well-known game of shinney, which is played, as a rule, only by young men. In former times it was only played at the celebration of the capture of a whale, now it may be played at any time. A specimen of bat (*lok-ɷhiuk*) was collected, which differs from the shinny stick as used by the tribes of the interior, in that it has no broad extended portion. The bat measures two feet nine inches in

length, the lower six inches being curved out at an angle of 20°. One side of this curved extremity is flattened. The specimen collected of the ball (*huoo*), is made from the body of some large vertebra. Williams states that in former times the ball was invariably made of whale-bone. The goals (*loquatsis*=for the mark) are two straight lines on the beach about 200 yards apart, and the starting-pofnt of the game is invariably from a point equi-distant between the goal lines.

TLAHATLA.—This is the game of battledore and shuttlecock, which so far as I know has not been observed beyond the limits of a prescribed area of the Northwest Coast. This is played equally by boys and girls. The bat (*tlahayak*), according to the specimen collected, is made of cedar board eight inches in diameter, and less than one-half inch thick. The shuttlecock consists of a two inch long piece of branch of salmonberry, in one end of which four feathers of a surf duck are thrust. There is no particular time for playing this game.

SOKTIS.—This is the well-known hand or grass game, of which two sets were collected. One set consits of four bone cylinders two and one-half inches long and three-quarters of an inch in diameter. Two of them have a groove about the center, one-half inch in width, which has been filled with many wrappings of black thread. The other set consists of two bones, the same length as those in the preceding set, but with a diameter not quite so great. Both of the bones of this set are plugged at one end with a piece of wood, while into the other a rifle cartridge has been thrust. One of the bones has two grooves one-quarter of an inch in width, and situated from each other about three-eighths of an inch. These grooves are filled with wrappings of black thread. The center of the bone lying between these grooves is occupied by a band of nine circles, each one having a hole in the center. This set is beautifully polished from long handling and is yellow from age. The marked pieces in the Makah game are known as *chokope* or men the unmarked being *hayop* or female. In playing they always guess for the female. The count is kept with twenty sticks (*katsak*). This game is so well known that a description of the method of playing is not necessary.

SACTS-SA-WHAIK=rolls far.—This is the most common and, perhaps, the best known game played by the Indians of Washington. It is played with ten discs (*huliak*), while the count is kept with twelve sticks (*katsake*). Four sets of this game were collected; two of them being made of elder, the other two of maple. None of the sets have any special markings to distinguish them from the ordinary sets of this region, except that in one set one side of the disc has eight small dots near the edge, and a black band near the edge on the other side. In all of the sets seven of the discs have perimeters, half white and half black. In three sets two of the remaining discs have a

perimeter entirely white, while that of the tenth disc is entirely black. In the fourth set the perimeter of two of the discs is entirely black, while that of the third disc is entirely white. In the three sets, where there is a single disc with an edge entirely black, it is known as *chokope* or man; the discs with white borders being known as *hayop* or female. In the fourth set, according to this nomenclature, there would be one female and two men. I was informed by Williams that the object of the game is to guess the location of the female, and, as the nomenclature was given him by me, I am at loss to reconcile the fact that in the three sets collected there were two females in each set. It is probable that in sets of this sort, the black-edged disc may be designated as the female, as without question it is the single disc, distinguished from all others in the set, which is the one sought for in every instance. This game, like the preceding, is also well known and has been so often described that it needs no further mention in this place. This game is played only by men.

EHIS.—This is the well-known game of the beaver-teeth dice, and is played by women throughout the extent of the Northwest territory. Of this game three sets were collected, one of which is imperfect. There are four teeth in each full set, two of which, usually the lower, are decorated with incised lines (*chihlichicotl*), which refers merely to the markings. The other pair are variously decorated with a single row of circles, or circles arranged in groups. These are known as *culkotlith* or dotted teeth. In two of the sets, one of the dotted dice is further distinguished by means of a band of black yarn about the center. This is known as *quisquis* or snow. The teeth are thrown from the hand upon the ground or upon a blanket. When the marked sides of all four teeth lie uppermost, the count is two, and is known as *dhabas* or all down. When the four plain sides lie uppermost, the count is also two, and is known as *tascoas* or without marks. When the two dotted dice fall face down, and the cross-hatch dice fall face uppermost, then the count is one, *chilitchcoas* or cross-hatch dice up. The exact reverse of this also counts one, and is known as *kulcocoas* or dots down. When one of the teeth is further distinguished by being wrapped with a black band, the count is somewhat different: all the marked sides uppermost, counting four; while the wrapped teeth up with three blank teeth, count four; also. The remaining counts are as before described.

KASKAS.—This game corresponds to the well-known cup and pin game of the Plains Indians, which among the neighbors of the Makahs is modified into the game with a wooden pin and snake or fish vertebræ. With the Makahs a humerus (*kashabs*) of the hair seal is, which is perforated at each end, is attached by means of a string passing through a hole in the middle of the bone to a wooden pin (*ka-a-piek*). The bone is tossed upward and as it falls it is caught on the end of the pin. What-

ever significance this game may have had in former times has evidently been lost, for, according to Williams, it is played merely for amusement, at any time and by both sexes.

BA–BUT'HL–KA–DI.—In addition to the above games, three tops were collected which are interesting, inasmuch as they are all different and of a type somewhat unlike that found in use by Indians of the interior. Williams was positive in his statement that all three varieties were in use by the Makahs before the advent of the whites, but he thought that they had been derived from northern Indians. The first specimen consists of a disc of wood, three inches in diameter and one-half inch thick, through which is thrust a pin, three and one-half inches in length, thus giving the form of an ordinary spinning top. The second specimen is a whipping top of unusual variety: the upper portion is rounded, terminating below in a plain, flat surface from which projects a wooden pin, about an inch in length, upon which the top is spun. The third top is exactly similar to those now used by white boys, and is pear shaped, terminating in a small protuberance, upon which is fastened the loop of string which is wound around the lower part of the top. Holding the string in one hand, the top is violently thrown upon the ground and is set spinning with the impetus which is imparted by the unwinding of the string.

Thus it will be seen that, of these eleven Makah games, three are dependent for their existence upon the proximity of the Makahs to the seashore, the chief material used in the three games being kelp; while in still another game we see modifications from the original buckskin ball of the Plains or Mountain Indians to a ball of whale-bone, while the game itself has become intimately bound up with the celebration of the capture of a whale.

EDITORIAL.

HONEST AND DISHONEST REVIEWING.

A volume on "The Cliff-Dwellers and Pueblos," prepared by the Editor of THE AMERICAN ANTIQUARIAN, appeared in the early part of last year, and was very favorably received. Complimentary reviews have appeared in many of the first-class journals, including The Independent and The Outlook of New York; Education, Literary World, and The Congregationalist of Boston; The Advance, The Journal of Theology, and The Times-Herald of Chicago.

There, however, appeared a criticism of the book in The Nation of September 20, 1900, written by an anonymous writer, which occupied three columns, and which dwelt only upon the form of the book and said nothing of its contents, and showed a determination to do all the damage to it and the author that was possible.

This was followed by two very harsh and abusive attacks from the pen of C. F. Lummis, in the successive numbers of "The Land of Sunshine," a journal published in Los Angeles, in which the very same criticisms were made, but couched in very abusive and scurrilous language, and yet giving every evidence of having been written by the same person who had prepared the anonymous article in The Nation.

This, however, did not seem sufficient, for the same editor and reviewer turns from the author of the book whom he has treated as harshly as possible, upon the editors of those journals who had so favorably reviewed the work, and charges them with "dishonesty" and "immorality" in recommending a book which they had not read," and then suggesting that "they read the article in The Nation and sit down and think"; and again following up the subject in a third number, with still severer language and still worse condemnation of these reviewers.

Now, the Editor of this journal does not propose to answer the criticism of this anonymous writer or the abuse by this man, who has so unceremoniously constituted himself the umpire and judge for all the better class of writers as to what constitutes a capable and correct review, but we do feel called upon to say that, before this self-constituted judge gives any decision on "honest reviewing," he should clear himself from the charge of dishonesty and hypocrisy, for certainly no honest man will hide behind the screen of an anonymous article, of which he himself is the author, and openly pretend that it represents the ideas of some other reviewer.

Has it got to that pass, that common sense cannot be exercised in reading a book, and common honesty and civility are not to be observed in reviewing it; but when a book is written upon a special subject and is sent to a reviewer he is to be allowed to misrepresent it, and then charge every one else with ignorance and "dishonesty" because they do not agree with him. It is the opinion of the present writer that personal integrity and an honest purpose not only to seek after the truth, but also to speak and write it, are prime qualifications for scientific, as well as for business and professional men, and that there is no excuse for anyone using exaggerated and abusive language, and least of all resorting to deceptive and misleading measures to give an air of authority to his criticism.

Men have been censured by scientific bodies who have not been guilty of a tenth part of the offense which this self-constituted critic has, and there is no such double standard as he has set up; for honesty and personal integrity are always and everywhere regarded as the essential element for science, as they are for religion and every other department in life.

EDITORIAL NOTES.

THE PARIS CONGRESS OF RELIGION.—This Congress was very different from the one which was held at Chicago in 1893, as it was put wholly on a scientific basis and had no popular aspects. It did not touch upon the diversity of religious beliefs, but was devoted to the history of religion. It was divided into eight sections: (1) the religion of non-civilized peoples and ancient America; (2) the religion of the extreme East; (3) the religion of Egypt; (4) the Semitic religions; (5) religions of India; (6) religions of Greece and Rome; (7) Germans, Celts, and Slavs; (8) Christianity.

We do not learn that any prominent American archæologist was present or took part, though the aboriginal religions of America are very interesting and important.

NEW DISCOVERIES.—Dr. A. L. Benedict, who has charge of the Ethnological Department of the Pan-American Exposition, has explored some mounds in Cattaraugus county, N. Y., and has found the bones of a musk-ox. These mounds may have belonged to the Eskimos, who preceded the Iroquois in New York and who were great hunters. It is the first case where the bones of the musk ox have been found so far south. Walrus teeth have been found in shell heaps on the coast of Maine, but these shell heaps have been ascribed to the Eskimos, who at the time of the Norsemen were as far south as Maine, for their boats are described by the Norsemen.

STARVING INDIANS.—It is frequently maintained that the Indians are not decreasing in number, and that the contact with whites has been a benefit to them, rather than otherwise. This, however, does not prove true in all cases, and, perhaps, should be regarded as exceptional rather than the rule. The Pimas of Arizona, who have, from time immemorial, been agriculturalists, and have depended upon irrigation for their crops, have recently been deprived of the usual supply of water by the white men, who have in some way gotten control. By this means an industrious, happy, and Christianized nation has become impoverished and are nearly starving. Ap-

peals have been made for their relief. Similar results have come upon several tribes of Cook Inlet Indians in Alaska. Out of a population of 1,000—the Indians of five tribes—over 400 are slowly starving and freezing to death. In former years they made a living by hunting. The miners have set fire to the forests, the game has disappeared. They have no furs for clothing and no furs to trade or to buy food with. They belong to the Russian church, but no one is doing anything to help them.

ANCIENT GREEK COINS.—A series of articles on this subject have appeared in *The American Journal of Numismatics*. The intense love of beauty innate in the Greeks shows itself in these coins. They date from 480 B. C. on to the Christian era, and show the religious symbolism which prevailed. Medals on the Discovery of South America have been struck by the Fouth Centennial of Brazil, which occurred in 1900.

HISTORIC PLACES.—A meeting called in Chicago on the 7th of December, for the purpose of calling attention to the places where early historic events took place, with the thought that they should be identified and preserved, monuments erected and the grounds laid out and ornamented. It is an excellent enterprise and should be encouraged. If local societies could be formed for this purpose, it would be of great benefit, as it would awaken the historic spirit among the people.

SILVER CROSSES.—*The American Journal of Numismatics* for October reports the discovery of two silver crosses—one found near Marquette, Mich., the other near Marquette, Wis.,—marked with the letters "C. A," in script as if made with the same stamp. The two crosses were made by workmen without proper tools, and both were from the same hand, as found by the punch mark and general form It is very singular that Marquette, Mich., was the place were the Claude Allouez was; and Marquette, Wis., is the place where Marquette found a village of Mascoutens and planted a cross there. It is evident that the same missionary was in both places. This is shown in an article by the Editor of THE AMERICAN ANTIQUARIAN on "The Lost Man."

THE ANTIQUITIES AT PARIS.—A series of articles in *The American Architect and Building News* by S. Beale, contains some very interesting descriptions of the antiquities gathered at the Paris Exposition. This was a feature of the Exposition which was overlooked by many. The reproduction of rooms and ancient dwellings from Hungary sculptures from the Farroe Islands, the door of a church from Iceland, also fragments of Greek sculpture, the throne of Artaxerxes at Susa, and other interesttng objects are mentioned. The example would be worthy of imitating at the Pan-American Exposition at Buffalo. Certainly there should at least be a model of the celebrated Griffon and other vessels which were so conspicuous in the early history of this country.

EXPEDITION TO AUSTRALIA.—Two explorers, Prof. Baldwin Spencer and Mr. Gillen, will conduct an expedition into Central and Northern Australia, under the patronage of the government, for the purpose of learning more about the folklore and customs of the aborigines.

EXPEDITIONS TO MEXICO.—Mr. M. H. Saville, associate editor of THE AMERICAN ANTIQUARIAN and ethnologist in the Museum of Natural History New York, started November 21st for a six months' exploration of the ruins at Mitla. Mr. Alfred Maudsley has also gone to Oaxaca on a ninth exploring expedition. No man has given more times than this indefatigable explorer, and there have already resulted from his expeditions a great accession to our knowledge of the ruins of this interesting regions. Prof. Frederick Starr, another of our associates, has gone on his fifth expedition to the same region. His work is mainly among the southern tribes—the Totonacs and Huastecas. He has already taken castes and photographs of many natives who represent the Otomis, Quinames, and other tribes which were known to the Spanish historians, though most of them have greatly degenerated.

BOOK REVIEWS.

PREHISTORIC IMPLEMENTS: A REFERENCE BOOK; A DESCRIPTION OF THE ORNAMENTS, UTENSILS AND IMPLEMENTS OF PRE-COLUMBIAN MAN IN AMERICA. By Warren K. Moorehead. Assisted by Professor G. H. Perkins, Mr. A. F. Berlin, Doctors L. G. Yates and R. Steiner Rev. H. C. Meredith, Messrs. G. E. Laidlaw and M. Wilkinson, Dr. J F. Snyder, and Prof. T. H. Lewis. Six hundred and twenty-one figures showing 3,000 specimens. Cincinnati: The Robert Clark Company.

This book has been severely criticised by Mr. C. F. Lummis, in his own characteristic language, but, as he has none of the qualities ot a careful reviewer, his criticism will not have much weight. What librarians and intelligent book-buyers want, is not abuse of the author of a book, but a description of the book itself and its contents, written in such a way that they may judge for themselves as to its character.

This, however, is to be said of every book published in America on archæology, that the demand for such books is not sufficient to warrant any publisher in assuming the expense, and so every author is obliged to do as Mr. Moorehead has done, publish at his own expense, and secure for it the imprint of some publisher like The Robert Clark Co., if he is fortunate enough to do so

It is to be further said, that when a man, who is struggling with disease and fighting against odds, publishes such a book, it is absolutely cruel for any harsh and unprincipled reviewer to attack him because of some imperfections in the arrangement, or some deficiencies in the proof-reading.

Of the book itself we would say, notwithstanding its deficiencies, it is the best book which has appeared upon the subject. It is very practical, and is full of new facts, and brings before the public a mass of information, which would not otherwise be reached; as nearly all the relics described are found in private collections, rather than public museums, and so are hidden from the sight of the majority of people. These collections were gathered from locations which are scattered from Maine to California, and from Ontario to the Gulf States; and are large enough to represent the regions from which they were gathered, and the most characteristic relics of the different regions are found in them.

The contributors to the volume are mainly the collectors themselves, though in some cases, the notes seem to have been furnished and Mr. Moorehead has put them into shape for publication. The names of these collectors are known to the archæologists generally, as they have already written for THE AMERICAN ANTIQUARIAN and *The Archæologist*, or have furnished reports for various societies, or have already published books of their own. The following is the list of the contributors and the districts which they represent: Mr. Lorimer Fison writes upon the implements of the Southwest—meaning by that term, the region formerly occupied by the Pueblos and Cliff-Dwellers—and he describes the pottery relics, the idols and images made from tufa, the hammers, fleshers, arrows, shell trinkets, ornaments, and digging sticks, which are common in that region, Mr. Moorehead has written upon the relics of the Upper Missouri, and described the arrow-heads, obsidian implements, spear-heads, pottery, stone hammers found in that region, from notes furnished by Mr. Brower; also the pottery, stone hammers, flint and copper objects found in the Upper Mississippi River region, from notes furnished by Mr, T. H. Lewis and Mr. Brower; he also has written an interesting chapter on the relics from the Great Plains and Lower Missouri, mainly from the material which had been published by Mr. Brower, in his two bulletins called " Harahey " and

"Quivira." This is a very interesting section, for it shows that the hunters of the Great Plains who followed the buffalo, used very large implements and weapons, such as spear-heads, celts, knives, chisels, grooved axes, hammers, and metates; though the relative size, as compared with others, cannot be told from any scale of inches or descriptions in this book,—the size of the cuts being the main evidence. Prof. George H. Perkins writes upon the relics gathered about Lake Champlain and along the Connecticut River. These consist mainly of gouges from Maine, copper knives from Vermont, pottery fragments and soap-stone dishes from Connecticut, also celts, axes, hammers, pestles, pitted stones, slate knives, stone pipes, tubular pipes, ceremonial stones, and arrow points from Connecticut. This contribution is one of the best contained in the book.

The relics from the Middle South, including those from Missouri, Arkansas, eastern Iowa, and southern Illinois, are more familiar to archæologists, for they have already been described by Col. C. C. Jones, Gen. G. P. Thurston, Mr. W. H. Holmes, and other writers, including Prof. F. W. Putnam and H. I. Smith. They need not be described here. Col. Young's collection is not so well known, and his description of diminutive arrow points from Tennessee, is interesting on that account.

The East Alleghany region is described by Mr. A. F. Berlin, and contains a great many relics of different kinds, but none of them so well finished, or so decidedly imitative, as are those of the region of the Ohio Valley. We may say of the Ohio Valley, that it stands out in striking outlines, as being the home of the most advanced and cultivated prehistoric people in the United States. The section describing this, should, however, have been placed next to the Middle South, for there is so great a resemblance between the relics of the two regions, as to give the idea that they were left by the same people. The accidental separation of the two sections may, however, show the contrast, as well as the resemblance, and so one is reconciled to the arrangement.

The relics of southern, central, and northern California are described by L. G. Yates, and are very interesting, as there is a greater variety to them and some of them are very unique. The most of these were made from the material which abounds in that region, and were used by fishermen and hunters. They consist of harpoons, needles, hair pins, saws, and ornaments made from bone; pipes of steatite, talc, serpentine, and quartz; ornaments made from shells; beads of agate and fluorspar; fish-hooks made of shells and tusks; stone implements of various kinds, and stone ollas; also many serrated arrows made from jasper; spears, engraved bones, harpoons, and pestles in great variety; all forming a very interesting series of relics, and never before described so fully.

The next section is said to include the St. Lawrence basin and Canada, but really is devoted to the copper objects of Wisconsin and Michigan. The notes were furnished by Mr. G. E. Laidlaw and Mr. MacWilkinson.

The last section is devoted to relics of the South, and is written by Dr. Roland Steiner of Georgia. It includes the stone relics of Tennessee, Georgia, West Virginia, and Mississippi, also the idols and effigy pipes from Etowah, Ga.; but does not include the relics from Florida. Mr. Moore has, however, covered that field, and a description of the relics there is not necessary.

There are a few lessons to be drawn from this book. They are as follows: First, The relics show the character and mode of life of the people who dwelt in each region, as well as the material which abounded there; as those which were gathered in New England were used in woodcraft; those which were gathered in Wisconsin were mainly of copper and were used for hunting purposes, as well as for domestic life; those which were gathered in the upper and lower Missouri region and the Great Plains were used for hunting large game, such as the buffalo; those gathered in the Ohio River, Cumberland, and Tennessee region were used by a sedentary people, who lived in villages and were well advanced in art; those which were gathered in the Southern States were used by an agricultural people; those in California were used by people, who were addicted to fishing and life by the sea. Second, The distribution of relics, such as the butterflies, ceremonial objects, and copper relics, on the other hand, show a very ex-

tensive commerce between the different tribes; the raw material having been gathered from a distance, but the relics have the stamp and art of the people who used them and among whom they were found. Third. The correlation between the relics found in each geographical locality to the structures which remain, as well as to the topography, is very instructive: and conveys this impression: that, if there was any very ancient occupation on this continent, no convincing evidence has yet been brought to light, for the relics found below the surface are of the same general character as those found at the greatest depth.

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A LIFE OF FRANCIS PARKMAN. By Charles Haight Farnham. Boston: Little, Brown & Company.

Mr. Francis Parkman, W. H. Prescott, George Bancroft, Hildreth, and Motley were all historians who belonged to a generation which has passed away. They were all of them graduates from the same university, and all devoted their life to one pursuit—the writing of history. Bancroft, Hildreth, and Parkman devoted their lives to American history; Prescott and Motley to both American and European history. They were not only the successors of Jared Sparks, who was the great biographer, but were students in Harvard College when Mr. Sparks was its president.

They have been followed by a very interesting class of historians, amongst whom are three bearing the time-honored name of Adams, viz.: Charles K., Henry, and Herbert B.; also Justin Windsor, the librarian of Boston and Harvard College, and still later by Prof. McMaster, Edward Eggleston, James Schouler, James F. Rhodes, Herman Von Holst of Chicago University, Prof. Turner of the University of Wisconsin, and Mr. H. H. Bancroft of California. Of these, the most interesting personage is Mr. Parkman, and for this reason the volume under review will be sought for by many readers, as well as by all the prominent libraries.

This book contains 303 pages, and is illustrated by two portraits, one of them representing Parkman as a youth, the last one, when he is past middle life. The one peculiarity of Mr. Parkman's character was, that which is not so plainly seen in the early portrait, but is exhibited by every line in the later one, namely, an indomitable will; a will which carried him through all the disabilities which came from poor health, and which haunted him to the very end of his life. "His ruling ideal was manliness, and his traits were distinctly those of a soldier," though he was devoted to a literary life all his days. He was a "pathetic figure to those who knew his sufferings"; but he was like an Indian in his endurance and his silence under pain. There is one lesson to be learned from his experience: he thought that he could master disease and pain by "crushing them by force." He resorted to gymnastics when a young man, but he really increased his difficulties by his heroic treatment, rather than lessened them. "Idleness and confinement were the hardest experiences life could impose upon him." "Love of action always pulled against the love of study"; but by his will power he followed a studious life, as closely as his nervous and rheumatic difficulties would permit, or physicians and specialists would allow. It is strange, when we read that during a portion of his life he could only study five minutes at a time, and was obliged to rest between spells and could not devote more than half an hour out of the twenty-four to his special work, without suffering seriously the consequence, that he could accomplish as much as he did.

He wrote his first book, "The Oregon Trail," after spending several months among the Indians of the plains. Fourteen years elapsed before he wrote "The Conspiracy of Pontiac," "a book which was declined by one of the principal publishers of New York, with the idea that both the subject and the style would deny the work any profitable success." He offered to the world a study of "The Last Remains of Primitive Society in the Stone Age," "A Picture of the Life of the Ancestors of Every Civilized Nation of To-day," but it was rejected at first; and yet afterwards charmed the world by the magical descriptive power, his "picture painting quality."

Parkman's theme "was the deepest joy of his life." He loved the woods; he admired the heroic; his mind was fascinated by adventure, the

adventures of others, if not of his own. He was a word-painter, who travelled far to look upon the scenes of history, and then fill them with the portraits of those who had once passed over the land and sailed the waters, and left no trail behind them, but whose traits and exploits were written and contained in records, which were well nigh inexcessible. The back-ground was furnished by Nature, the portraits by manuscripts and reports, which were written in French, but were hidden from view and required many boyages across the ocean to reach.

LaSalle, Joliet and Hennepin were the heroes of the West; Champlain, Cartier, and Frontenac were the heroes of the St. Lawrence; the Huguenots were the heroes of Virginia and the southern Atlantic coasts; the Jesuits were the heroes of the Upper Canada, the Great Lakes and the Mississippi River. The heroic elements were brought out in all their strength and conquering power, and have made the different parts of Continent notable for the personal endurance, rather than for the great works which they individuall accomplished, though the work of exploration and discovery made them the leaders and forerunners of the civilization which we now enjoy.

The book is a portrait of a silent hero, who endured in private, but gained great victories for the public, and "whose pen was mightier than the sword."

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AMULETI ITALIANI CONTEMPORANEI: Dr. Giuseppe Bellucci. Perugia, 1898. Narrow 8°, pp. 104.

In 1880 Dr. Bellucci exhibited a small collection of Italian amulets at the International Congress of Anthropology and Prehistoric Archæology at Lisbon. The collection then required four tablets (32 x 45 cm.) for its mounting. Since that time his collection has been exhibited at Milan in 1881, at Pargi in 1889 and, finally, at Turin in 1898. On the last occasion eighteen tablets were necessary for the display of the collection, which contained more than five hundred and twenty-five specimens. The little book before us is the catalogue of this interesting and notable series.

The collection comprises only Italian amulets, most of which are still used. Exceptionally, for purposes of comparison, ancient and classical amulets are introduced. The arrangement of the catalogue is admirable. The collection is described tablet by tablet. A concise statement is made regarding the character and virtue of the objects on a tablet; each amulet is then individually described and the locality and circumstances of its finding or use, presented. Two tablets are filled with flint arrow-heads which have been used as amulets. Sometimes these have been carried, just as found; sometimes they have been pierced for suspension, or mounted in silver with a ring attached for the passage of a cord. These arrow-head amulets are particularly employed against lightning stroke. One tablet is taken up with polished stone hatchets, "thunderstones," which have been employed in the same way. From these objects of stone, which are potent from their antiquity or their form, the author passes to a great class of stone amulets where it is the material which gives virtue. Serpentine, neprite, chalcedony, rock crystal, blood stone, star-stone (fossil coral), are among those which are potent against danger, diseases, or the "evil eye." In their use and specific application we find interesting examples of sympathetic magic or the "doctrine of signatures." Many interesting amulets in the collection are derived from the animal kingdom. Red coral, especially when worked into certain significant forms, has a wide use. Shells of cypræa, the horney interior shell of some slugs, sea horses, the teeth of sharks (either living or fossil, though particularly the latter), are among the long list of animal substances displayed. Of particular interest are the amulets made from pieces of human skull, and worn against epilepsy—a survival probably from Neolithic times. Medals and other amulets related to the Christian religion are also contained in this collection. It is easily seen that Dr. Bellucci has brought together an astonishingly rich and instructive a series. The mere catalogue of it, which he here presents, is full of suggestion and information. (F. S.)

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IT is now about twenty-three years since THE AMERICAN ANTIQUARIAN was established. During that time the field of archæological study has spread, until it now embraces nearly the whole globe. The explorations and discoveries have not ceased in America, but they have so increased in lands of the East, especially in Egypt, Babylonia, Greece, and Palestine, that they have eclipsed all others. During the past year other fields of study and exploration have opened by means of war in Africa, China, and the Philippine Islands; so that now the whole world comes very naturally into the scope of the journal.

The Editor, Rev. Stephen D. Peet, Ph. D., is an Oriental scholar, as well as an Americanist, and is qualified to edit a journal which takes in lands of the East as well as the different parts of our own land. Aside from this general over sight, scholars, who are specialists in the different departments of archæology, have been secured as contributors, and will keep the readers informed about all discoveries made in particular lands, whether Egypt, Babylonia, Assyria, Palestine, Greece, Australia, China, or the Philippines—many of them residents of the lands which they represent.

The subjects which are treated are many and varied, though all of them may be classed under the science of anthropology. When mentioned in alphabetical order they are as follows: Art and Architecture, Biblical Antiquities, Civilization, Division of the Races, Ethnology, Early Institutions, Folklore, Geology and Geography, Mythology, Migrations, Origin of the Species, Oriental Discoveries, Prehistoric Relics, Recent Discoveries, Religious Beliefs, Social Customs, Superstitions, Totemism, etc.

Contributions may be expected from nearly all parts of the world, for correspondence has been held with gentlemen, who are the best scholars in their departments and whose names are well known.

Among the contributors of last year were the following, arranged according to localities: Elsdon Best and Dr. John Frazer, Australia; James Deans, C. Hill-Tout, and Rev. John Maclean, Canada; Prof. A. F. Chamberlain, Worcester, Mass.; Rev. J. N. Fradenburgh. Franklin, Penn.; Rev. William C. Winslow, D. D., Boston, Mass.; Prof. Robert Harper and Prof. Frederick Starr, Chicago University; C. Staniland Wake, Field Columbian Museum; Pres. C. F. Super, Athens, Ohio; Hon. James Wickersham, Tacoma, Wash. The same gentlemen will continue to contribute during the year 1901, and a large number of others in addition. Arrangement has been made so that the book reviews will be especially valuable and will include such books as are published on anthropology, in different languages.

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